

BASIC趣味程序选（一）

谭浩强 编译

清华大学出版社

BASIC 趣味程序选（一）

谭浩強　　编译

清华大学出版社

内容简介

本书是参考国外一些资料而编写的一本趣味程序选，书中包括模拟游戏、智力锻练等趣味程序。它不仅可以使儿童、青少年增加学习科学技术知识的兴趣，同时还可以使学习过 BASIC 的读者扩大其知识领域，提高编写程序的技巧。

本书可作为学习 BASIC 语言的参考材料，还可供各微型计算机、中小学、业余少年儿童活动单位开展“电子游戏”时使用。

BASIC 趣味程序选（第一集）

谭浩强　编译

☆

清华大学出版社出版

北京　　清华园

清华大学印刷厂排版印刷

新华书店北京发行所发行　各地新华书店经售

☆

开本：787×1092 1/32 印张：8 字数：180 千字

1984 年 2 月第一版 1985 年 2 月第 2 次印刷

印数：40000～100000

统一书号：15235.87　定价：1.30 元

前　　言

BASIC 是目前国际上广泛使用的一种计算机语言。随着微型计算机的出现和迅速推广，BASIC 不仅已应用于数值计算和企业管理，而且正在渗入少年儿童的教育领域和家庭生活之中。在国外，常常用 BASIC 编写程序对青少年进行智力训练和模拟生活中的游戏，这样既可以实现游戏的"电子化"，提高青少年、儿童学习科学知识的兴趣，从而锻炼他们的智力，又可以扩大 BASIC 的应用范围、提高学习 BASIC 的兴趣和编写程序的技巧，因此 BASIC 趣味程序愈来愈为国内外读者所欢迎。

根据国内广大计算机爱好者的要求，我们编写了"BASIC 趣味程序选"。本书一部分选译自美国出版的"BASIC COMPUTER GAMES"和其它一些外国资料（在编选时对部分程序作了修改），另外一些是我们自编的。其中有模拟游戏程序、智力锻炼程序以及其它一些令人感兴趣的程序。对每一个程序我们都编写了使用说明，绝大多数程序都附有运行结果。这样做既可以供未学过 BASIC 的人按照说明来玩游戏或运行程序，又可以供已学过 BASIC 的读者挑选若干程序对它们的算法和编写程序的思路以及技巧进行深入的分析。对复杂的程序最好画出流程图对照分析，以提高阅读和编写各种类型程序的能力，同时还可以尝试用另外的方法去编写程序，或者对程序作出某些改进和发展。

考虑到国内微型计算机的配置情况以及使趣味程序能更好

地实现，我们基本上是按 TRS-80 LEVEL Ⅱ BASIC 规则编写的。书中大多数程序可以直接（或作少许修改后）在其它型号计算机上运行。读者所用的如果不是 TRS-80 BASIC，可以自己动手修改程序。我们在本书第一集的附录中列出了 TRS-80 BASIC 的语句和函数，并介绍怎样将 TRS-80 BASIC 写的程序改写为其它计算机 BASIC 能接受的程序。

本书是为了配合 BASIC 语言的学习而编写的一本参考读物，我们期望它能起抛砖引玉的作用。相信广大读者在阅读本书之后会受到启发，自己动手编写出更好、更适合我国情况的各种趣味程序。欢迎读者把你们写的程序寄给我们，我们将选择汇编出版本书的以后各集以飨读者（来稿请提供程序清单、运行记录和使用说明，并请说明所用计算机型号。请尽量不使用只适用于少数计算机的特殊语句和函数）。

本书是由《计算机世界》编辑部组稿的并提供了有关国外资料。编这类读物我们还缺乏经验，缺点和错误一定不少，诚恳地希望读者指正。

请带着这本书上机，它一定会给你带来乐趣！

[注：由于本书版面较窄，每行只能排三十多个字符，因此在程序中或输出的结果中一行的内容在本书中有时不得不排在二行上，请读者鉴谅。]

编　者

一九八三年八月

目　　录

第 一 集

1. 加 法 测 验

给儿童出二位整数加法题目，要他们从键盘上敲入答数。如答对，计算机打印出“GOOD!”，接着计算机又出另一题；如答不对，则打印出“TRY AGAIN!”（再做一次），并重新打印此题，直到算正确为止。

如：

12 + 43 = ? 55（问号后面的 55 是游戏者从键盘敲入的。下同）

GOOD!

58 + 75 = ? 133

GOOD!

83 + 31 = ? 124

TRY AGAIN!

83 + 31 = ? 68

TRY AGAIN!

83 + 31 = ? 114

GOOD!

⋮

程序为：

```
10   A = INT(100 * RND (0))
20   B = INT(100 * RND (0))
30   PRINT A;"+";B;"=";
40   INPUT C
50   IF C = A + B THEN 80
60   PRINT "TRY AGAIN!"
```

```
70   GO TO 30
80   PRINT "GOOD!"
90   GOTO 10
100  END
```

2. 除法测验(给答案)

计算机给出两位整数和一位整数，要求你心算出它的商和余数。如果你给出的商或余数都对，计算机会称赞你"VERY GOOD"，并另出新题；如果答错了（回答的商或余数之一错或二者全错）打印"WRONG!"并要求你重做此题。同一题三次错，计算机就会告诉你正确答案。

如：
```
50/3 = ?16, 2            (16 为商，2 为余数)
VERY GOOD!
41/8 = ? 5, 2
WRONG!
41/8 = ? 4, 3
WRONG!
41/8 = ? 5, 0
WRONG!
THEY ARE 5, 1            (应当是商为 5 余 1)
80/7 = ?
  ⋮
```

程序为：

```
5    N=0
10   A=INT(100*RND(0))
20   B=INT(10*RND(0))
```

```
30  PRINT A; "/"; B; "=";
40  INPUT C, D
50  C1=INT(A/B)
60  D1=A-C1*B
70  IF C=C1 AND D=D1 THEN 130
80  N=N+1
90  PRINT"WRONG! "
100 IF N < 3 THEN 30
110 PRINT "THEY ARE"; C1; ", "; D1
120 GOTO 5
130 PRINT "VERY GOOD! "
140 GO TO 5
200 END
```

3. 乘法测验(自动判分)

计算机出十道乘法题（一个一位整数乘以一个一位或两位的整数）请你回答，你将计算的结果打入。如果十道题你都回答对了，则最后会给你 100 分，错一题扣 10 分。10 道全对，打印出"VERY GOOD! "。对八道以上，给出"GOOD! "。对 6 道或 7 道的，给出"PASS! "。对五道以下，给出"FAIL"。

```
NO.1        2*24=? 48
NO.2        3*92=? 187
NO.3        6*72=? 432
NO.4        4*14=? 56
NO.5        7*21=? 147
```

```
NO.6          3 * 31 = ? 93
NO.7          5 * 15 = ? 75
NO.8          6 * 46 = ? 276
NO.9          9 * 9 = ? 81
NO.10         1 * 82 = ? 82
YOUR SCORE IS 90
GOOD!
```

程序为:

```
20  S = 0
30  FOR I = 1 TO 10
40  A = INT(10 * RND(0))
50  B = INT(100 * RND(0))
60  PRINT"NO."; I,
70  PRINT A; " * "; B; " = ";
80  INPUT C
90  IF C < > A * B THEN 110
100 S = S + 10
110 NEXT I
120 PRINT " YOUR SCORE IS"; S
130 IF S<60 PRINT "FAIL! ": GOTO 170
140 IF S<80 PRINT "PASS! ": GOTO 170
150 IF S<100 PRINT "GOOD! ": GOTO 170
160 PRINT "VERY GOOD! "
170 END
```

4. 判卷给分

你出一组选择题，每个题都有一个正确的答案。例如，其

中一个题目如下：

中国人口为：(1) 6 亿 (2) 8 亿 (3) 9 亿 (4)10亿

正确的答案为 (4)，即 10亿。

你把这组题目的正确答案(用数字表示的，如"4"表示应选第4项) 打入计算机，然后把试卷交给学生做，让他们将答案打入计算机。计算机会将它们与正确的答案相比，并显示这个学生答对了几题，可以让不同的学生先后打入他们的回答。

110 语句是 TRS-80 计算机 BASIC 中用来清除屏幕画面的，它可以使学生看不到你刚才打入的正确答案。

TEST SCORING

INTUT THE NUMBER OF ANSWERS? 5 (一共有几道题？你打入5表示试卷中有5道题)

INPUT CORRECT ANSWERS:

(你将这五道题的正确答案打入)

NO.1? 3 (第一题的正确答案为(3))

NO.2? 2 (第二题的正确答案为(2))

NO.3? 1 (第三题的正确答案为(1))

NO.4? 2 (第四题的正确答案为(2))

NO.5? 3 (第五题的正确答案为(3))

(屏幕画面清除，以下由学生打入他的答案)

STUDENT'S ANSWERS:

NO.1 ANSWER? 2

NO.2 ANSWER? 2

NO.3 ANSWER? 1

NO.4 ANSWER? 3

```
NO.5  ANSWER? 3
YOUR SCORE IS 3
```
（答对三题）

（清除画面后由另一学生回答）

```
STUDENT'S ANSWER:
NO.1  ANSWER? 3
NO.2  ANSWER? 2
NO.3  ANSWER? 1
NO.4  ANSWER? 2
NO.5  ANSWER? 3
YOUR SCORE IS  5
```

程序为：

```
10  PRINT TAB (15);  "TEST SCORING"
20  DIM A(100), C(100)
30  PRINT
40  PRINT"INPUT THE NUMBER OF ANSWERS";
50  INPUT N
60  PRINT "INPUT  CORRECT  ANSWERS:"
70  FOR I=1 TO N
80  PRINT "NO."; I;
85  INPUT C(I)
90  NEXT I
100 CLS
110 PRINT "STUDENT'S ANSWERS: "
120 FOR I=1 TO N
130 PRINT "NO."; I; TAB(10); "ANSWER";
140 INPUT A(I)
```

```
145 IF A(I)=0 THEN 240
150 NEXT I
160 S=0
170 FOR I=1 TO N
180 IF A(I) <> C(I) THEN 200
190 S=S+1
200 NEXT I
205 PRINT
210 PRINT "YOUR SCORE IS"; S
220 PRINT
230 GOTO 100
240 END
```

5. 给"余"猜数

你心里先想好一个 1—100 之间的整数 X，将它分别除以 3、5和7并得到三个余数。你把这三个余数告诉计算机，计算机能马上猜出你心中的这个数。

用什么简单的方法可以很快地求出此数？如果想不出，可以看程序中 100—130 语句。游戏记录如下：

PLEASE THINK OF A NUMBER BETWEEN 1 AND 100.

YOUR NUMBER DIVIDED BY 3 HAS A REMAINDER OF? 1（你的数除以3余几？1）

YOUR NUMBER DIVIDED BY 5 HAS A REMAINDER OF? 0（你的数除以5余几？0）

YOUR NUMBER DIVIDED BY 7 HAS A REMAINDER OF? 5（你的数除以7余几？5）

LET ME THINK A MOMENT…
YOUR NUMBER WAS 40,RIGHT?YES(你的数是40)
HOW ABOUT THAT!!
LET'S TRY ANOTHER.
PLEASE THINK OF A NUMBER BETWEEM 1
AND 100.
YOUR NUMBER DIVIDED BY 3 HAS A
REMAINDER OF? 1
YOUR NUMBER DIVIDED BY 5 HAS A
REMAINDER OF? 0
YOUR NUMBER DIVIDED BY 7 HAS A
REMAINDER OF? 2
LET ME THINK A MOMENT…
YOUR NUMBER WAS 100, RIGHT? YES
HOW ABOUT THAT!!
LET'S TRY ANOTHER.
PLEASE THINK OF A NUMBER BETWEEN 1
AND 100.
YOUR NUMBER DIVIDED BY 3 HAS A
REMAINDER OF? 0
YOUR NUMBER DIVIDED BY 5 HAS A
REMAINDER OF? 4
YOUR NUMBER DIVIDED BY 7 HAS A
REMAINDER OF? 4
LET ME THINK A MOMENT…
YOUR NUMBER WAS 39, RIGHT? NO
I FEEL YOUR ARITHMETIC IS IN ERROR.

```
LET'S TRY ANOTHER.
PLEASE THINK OF A NUMBER BETWEEN
   1 AND 100.
YOUR NUMBER DIVIDED BY 3 HAS A
   REMAINDER OF? 1
YOUR NUMBER DIVIDED BY 5 HAS A
   REMAINDER OF? 1
YOUR NUMBER DIVIDED BY 7 HAS A
   REMAINDER OF? 1
LET ME THINK A MOMENT...
YOUR NUMBER WAS 1, RIGHT? YES
HOW ABOUT THAT!!
```

程序为：

```
30  PRINT "PLEASE THINK OF A NUMBER
    BETWEEN 1 AND 100."
40  PRINT"YOUR NUMBER DIVIDED BY 3 HAS
    A REMAINDER OF";
45  INPUT A
50  PRINT "YOUR NUMBER DIVIDED BY 5
    HAS A REMAINDER OF";
55  INPUT B
60  PRINT "YOUR NUMBER DIVIDED BY 7
    HAS A REMAINDER OF";
65  INPUT C
80  PRINT "LET ME THINK A MOMENT..."
90  FOR I=1 TO 1500: NEXT I
100 D=70*A+21*B+15*C
```

```
110 IF D<=105 THEN 140
120 D=D-105
130 GOTO 110
140 PRINT "YOUR NUMBER WAS"; D;",
    RIGHT";
160 INPUT A$
170 IF A$="YES" THEN 220
180 IF A$="NO" THEN 240
190 PRINT "EH? I DON'T UNDERSTAND '";
    A$; "' TRY 'YES' OR 'NO'."
200 GOTO 160
220 PRINT "HOW ABOUT THAT! ! "
230 GOTO 250
240 PRINT "I FEEL YOUR ARITHMTIC IS IN
    ERROR."
250 PRINT "LET'S TRY ANOTHER."
260 PRINT
270 GOTO 30
999 END
```

6. 判 素 数

你打入任意一个正整数，计算机会立即告诉你，此数是否素数（质数）。所谓素数就是除了1和此数本身之外，不能被任何其它整数整除的自然数。

如果打入一个"0"，则程序结束运行。

```
                    PRIME NUMBER

       YOUR NUMBER? 12
       12 IS NOT A PRIME NUMBER
       YOUR NUMBER? 19
       19 IS A PRIME NUMBER
       YOUR NUMBER?   23
       23 IS A PRIME NUMBER
       YOUR NUMBER? 2
       2 IS A PRIME NUMBER
       YOUR NUMBER?  0
```

程序为：

```
10  PRINT TAB(20); "PRIME NUMBER"
20  PRINT
30  PRINT "YOUR NUMBER";
40  INPUT N
50  IF N=0 THEN 180
55  IF N=1 THEN 130
60  IF N=2 THEN 100
70  FOR I=2 TO SQR(ABS(N))
80  IF N/I=INT(N/I)THEN 130
90  NEXT I
100 PRINT N; "IS A PRIME NUMBER"
120 GOTO 30
130 PRINT N; "IS NOT A PRIME NUMBER"
150 GOTO 30
```

```
180 END
```

7。 因数分解

你打入任意一个整数，计算机立即会将它分解为各因子的乘式，运行记录如下：

```
INPUT NUMBER TO BE FACTORED TO END
    PROGRAM INPUT 0? 56
56=(2 * *3)(7)(1)                    (2* *3表示2³)
NUMBER? 999
999=(3* *3)(37)
NUMBER? -450
-450=-(2)(3* *2)(5* *2)(1)
NUMBER? 0
```

如果不想再继续进行下去，可打入“0”，则程序停止运行。

程序为：

```
100 PRINT"INPUT NUMBER TO BE FACTORED。
    TO END PROGRAM INPUT 0";
110 INPUT N
115 IF N=0 THEN 260
120 PRINT N; "=";
135 IF SGN(N)< >-1 THEN 139
136 PRINT"-";
139 N=ABS(N)
140 FOR I=2 TO SQR(N)
```

```
150 S=0
160 IF N/I< >INT(N/I) THEN 200
170 N=N/I
180 S=S+1
190 GOTO 160
200 IF S=0 THEN 220
204 IF S=1 THEN 215
210 PRINT "("; I; "**"; S; ")";
212 GOTO 220
215 PRINT "("; I; ")";
220 NEXT I
225 PRINT "("; N; ")"
230 PRINT
240 PRINT "NUMBER";
250 GOTO 110
260 PRINT
270 END
```

8. 水仙花数

所谓水仙花数系指一个三位数，其各位数字立方和等于该数。例如 153 为一水仙花数，因为 $153=1^3+5^3+3^3$。找出 100 到 999 之间全部水仙花数。

```
                    NARCISSUS NUMBERS
153           370           371           407
```

程序为：

```
10  PRINT TAB(20); "NARCISSUS NUMBERS"
20  FOR I=100 TO 999
```

```
30  LET A=INT(I/100)
40  LET B=INT((I-A*100)/10)
50  LET C=I-INT(I/10)*10
60  IF I< >INT(A*A*A+B*B*B+C*C*C)
    THEN 80
70  PRINT I,
80  NEXT I : END
```

9. 完数分解

一个数如果被分解为若干因子，而这些因子之和正好等于这个数本身，则此数称之为"完数"。例如：6的因子为1,2,3，同时，6=1+2+3，则6就是一个完数。

找出1000之内的所有完数，并分解为因子。

```
10  PRINT TAB(30);"COMPLETE NUMBER"
20  DIM S(50)
30  PRINT
35  Y=0
40  FOR I=6 TO 1000
41  K=0
45  FOR Z=1 TO 50
50  S(Z)=0
55  NEXT Z
60  Z=0
65  FOR J=2 TO I
70  IF I/J< >INT(I/J) THEN 95
75  X=I/J
80  K=K+X
```

```
85  Z=Z+1
90  S(Z)=X
95  NEXT J
100 IF K< >I THEN 145
102 IF Z=1 THEN 145
105 PRINT I; " ITS FACTORS ARE ";
110 FOR Z=50 TO 1 STEP-1
115 IF S(Z)=0 THEN 125
120 PRINT" "; S(Z);
125 NEXT Z
130 PRINT
135 Y=Y+1
140 NEXT I
145 PRINT "Y=";Y
150 END
```

运行情况为：

```
            COMPLETE NUMBERS

6   ITS FACTORS  ARE 1 2 3
28  ITS FACTORS ARE 1 2 4 7 14
496 ITS FACTORS ARE 1 2 4 8 16 31 62 124 248
Y=3
```

（即 1000 之内只有三个完数）

10. 找 完 数

从上面一个“完数分解”中可知6是一个完数，因为6=1+2+3，它是一个偶完数。有一公式可以找出偶完数。

$$C=2^{n-1}(2^{n}-1)$$

其中 μ 是一个素数，而且要求（$2^{\mu}-1$）仍为一个素数。例如：$\mu=3$，则

$C=2^{3-1}\cdot(2^3-1)=2^2\times7=28$　故 28 为一完数

又如：$\mu=2$，则

$C=2^{2-1}\cdot(2^2-1)=2^1\times3=6$，故 6 为一完数。

⋮

今想寻找 μ 在 20 之内的所有的完数。

```
10  PRINT TAB(30); "TO FIND COMPLETE
    NUMBERS"
15  PRINT
20  FOR P=2 TO 20
25  IF P=2 THEN 65
30  FOR B=2 TO SQR(P)
35  IF P/B=INT(P/B)THEN 70
40  NEXT B
45  X=2↑P-1
50  FOR N=2 TO SQR(X-1)
55  IF X/N=INT(X/N) THEN 70
60  NEXT N
65  PRINT "P="; P,
66  M=INT(2↑P-1+1E-03)
67  PRINT "M="; M,
68  C#=INT(2#↑(P-1)*M+1E-03)
69  PRINT "C="; C# (#表示双精度)
70  NEXT P
75  END
```

程序运行结果为：

TO FIND COMPLETE NUMBERS

P=2	M=3	C=6
P=3	M=7	C=28
P=5	M=31	C=496
P=7	M=127	C=8128
P=11	M=2047	C=2096128
P=13	M=8191	C=33550336
P=17	M=131071	C=8589869055
P=19	M=524287	C=137438691327

上面的 P 代表μ，M代表 $2^{\mu}-1$，C 代表完数。即：

$$C=2^{P-1}\cdot M$$

11. 人 口 爆 炸

82 年全国第三次人口普查的结果是全国总人口为 10 亿 3 千多万。如果我们不厉行计划生育政策，若干年后我国将有多少人呢？我们用计算机预算出的结果会使那些想“多生一个”的人大吃一惊。如果每年人口增长率为 3 %。2000 年全国人口为 17.5 亿，到 2050 年时达 77 亿，而 1000 年以后则为 7×10^{21} 人，即七十万亿亿，这是个天文数字。它到底多大呢？我国面积（包括高山、沙漠、江河、湖泊在内）为 960 万平方公里，每平方米上需要居住 7.3×10^{8} 人，即 7.3 亿人。即使全国都盖满 100 层的摩天大楼，也无法容纳这么多人。如果真出现这样的情况，那真是人无立锥之地的可怕的情景。如果人口增长率为 2 %，则 2000 年时为 14.7 亿人，

1000 年以后为 4.1×10^{17} 人，每平方米居住 43,000 人。如果年增长率为 1 %，1000 年后为 2.16×10^{13} 人，即二万亿人，每平方米居住 2 人。如能将增长率降到千分之五，则 1000 年后我国人口为 150 亿人，每平方米居住 0.015 人。而现在我国每平方米只居住 0.0001 人。

请看下页结果。

在下页打印的结果中，对应于每一个增长率有两行数字，第一行是人口总数，第二行是每平方米居住的人数。数以指数形式表示，如 7.08046E+21 表示 7.08046×10^{21}。

程序为：

```
10  DIM Y(3), P(3), A(3)
20  P1=1030000000
30  READ Y(1), Y(2), Y(3)
40  PRINT "RATE", "2000","2050", "AFTER 1000
    YEARS"
45  PRINT
50  FOR R=0.03 TO 0.005 STEP-0.005
60  FOR I=1 TO 3
70  P(I)=P1*(1+R)↑(Y(I))
75  A(I)=P(I)/9600000000000
80  NEXT I
90  PRINT R, P(1), P(2), P(3)
92  PRINT" ", A(1), A(2), A(3)
100 NEXT R
140 DATA 18, 68, 1000
200 END
```

RATE （增长效率）	2000（年）	2050（年）	AFTER 1000 YEAR （一千年后）
0.03	1.7535E+09（总人口）	7.6872E+09	7.08046E+21
	1.82656E-04（人/米²）	8.0075E-04	7.37547E+08
0.025	1.60644E+09	5.52153E+09	5.45384E+19
	1.67337E-04	5.75159E-04	5.68108E+06
0.02	1.47109E+09	3.95957F+09	4.10212E+17
	1.53238E-04	4.12455E-04	42730.4
0.015	1.34656E+09	2.83483E+09	4.01216E+15
	1.40266E-04	2.95294E-04	313.766
0.01	1.23203E+09	2.02623E+09	2.15879E+13
	1.28336E-04	2.11065E-04	2.24873
5E-03	1.12674E+09	1.44587E+09	1.50972E+11
	1.17168E-04	1.50611E-04	0.0157262

下面的程序用来计算人口增长率。

1982 年中国人口为十亿，如果打入 2000 年末时人口限制数字．想知道每年的人口增长率应限制百分之几的范围内。

例如，要求 2000 年时中国人口不超过 12 亿，则计算出每年的人口增长率不应超过 0.853%。如果希望 2000 年时中国人口不超过 13 亿，则年人口增长率不应超过 1.30176%。

如果不想再测算，则打入"0"。

```
            GROWTH RATE OF POPULATION
POPULATION IN 2000? 1.2E9
YOUR GROWTH RATE MUST BE LESS THAN
   8.53E-03
POPULATION IN 2000? 1.3E9
YOUR GROWTH RATE MUST BE LESS THAN
   1.30176E-02
POPULATION IN 2000? 1.5E9
YOUR GROWTH RATE MUST BE LESS THAN
   2.11103E-02
POPULATION IN 2000? 1.1E9
YOUR GROWTH RATE MUST BE LESS THAN
   3.6595E-04
POPULATION IN 2000? 0
```

程序为：

```
10 PRINT TAB(20); "GROWTH RATE OF
   POPULATION"
```

```
20  PRINT
30  PRINT "POPULATION IN 2000";
40  INPUT P
45  IF P=0 THEN 110
50  PRINT
60  LET R=(P/1.03E9)↑(1.0/18)-1
70  PRINT "YOUR  GROWTH  RATE  MUST  BE
    LESS THAN"; R
80  PRINT
100 GOTO 30
110 END
```

求 R 的值的计算公式是这样得来的：

$$P=10^9\cdot(1+R)^{18}$$

$$\therefore \quad \frac{P}{10^9}=(1+R)^{18}$$

$$\sqrt[18]{\frac{P}{10^9}}=1+R$$

$$\therefore \quad R=(P/10^9)^{1/18}-1$$

12. 人 口 预 测

1982 年中国人口为十亿三千万，我们希望在给出年人口增长率后，计算机能够打印出从 1983 年到 2000 年每年中国的人口数。

```
10  PRINT TAB(15); "POPULATION"
20  PRINT
25  P=1.03E9
30  PRINT "R=";
40  INPUT R
50  FOR Y=1 TO 18
60  P=P*(1+R)
70  PRINT 1982+Y; TAB(14);INT(P)
80  NEXT Y
90  END
```

```
               POPULATION

R=? 0.01
1983           1.0403E+09
1984           1.0507E+09
1985           1.06121E+09
1986           1.04060E+09
1987           1.07182E+09
1988           1.082538E+09
1989           1.09336E+09
1990           1.10429E+09
1991           1.11534E+09
1992           1.12648E+09
1993           1.13775E+09
1994           1.14912E+09
1995           1.16061E+09
1996           1.17222E+09
```

1997	1.18393E+09
1998	1.19577E+09
1999	1.20773E+09
2000	1.21981E+09

上述结果表明，当年增长率为 0.01 时，公元 2000 年时我国将有人口十二亿一千九百八十一万余人。

再来看看，当人口增长率控制在不同的数字时，人口达到 12 亿需要多少年。可以看到，当 R=3% 时，只要 6 年，人口就达到 12 亿。而当 R=1% 时，16 年后达 12 亿，而 R=0.5% 时，31 年后（即 2013 年）才达 12 亿。

R=0.03	N= 6	Y=1988	P1=1.22985E+09
R=0.025	N= 7	Y=1989	P1=1.22432E+09
R=0.02	N= 8	Y=1990	P1=1.20678E+09
R=0.015	N=11	Y=1995	P1=1.21323E+09
R=0.01	N=16	Y=1998	P1=1.20768E+09
R=5E-03	N=31	Y=2013	P1=1.20207E+09

程序为：

```
10  READ R
20  IF R=-1 THEN 140
30  P1=1030000000
40  N=0
50  P1=P1*(1+R)
60  N=N+1
70  IF P1>=1200000000 THEN 30
80  GOTO 50
90  PRINT "R="; R, "N="; N, "Y="; 1982
     +N, "P1="; P1
```

```
100 DATA 0.03,0.025,0.02,0.015,0.01,5E-0.3, -1
120 GOTO 10
140 END
```

13. 杨辉三角形

杨辉三角形的每一行是 $(x+y)^n$ 的展开式各项的系数。如第一行的 1 就是 $(x+y)^0$ 的系数，第三行的 1，2，1是 $(x+y)^2$ 的展开式 $x^2+2xy+y^2$ 各项的系数。可以看出:对角线和每行的第一列都为 1，其余各项是它的上一行中前一个元素和上一行的相应位置的元素之和。例如，第四行第二列的值（3），是第三行第一列和第二列两个元素之和。

你想打印多少行的杨辉三角形，可以在开始将此数字打入计算机。

```
? 10
      1
      1    1
      1    2    1
      1    3    3    1
      1    4    6    4    1
      1    5    10   10   5    1
      1    6    15   20   15   6    1
      1    7    21   35   35   21   7    1
      1    8    28   56   70   56   28   8    1
      1    9    36   84   126  126  84   36   9    1
```

程序如下:

```
5  INPUT N
10 DIM A(N,N)
```

```
20  FOR I=1 TO N
30  LET A(I,I)=1
40  LET A(I,1)=1
50  NEXT I
60  FOR I=3 TO N
70  FOR J=2 TO I-1
80  LET M=I-1
90  LET A(I,J)=A(M,J-1)+A(M,J)
100 NEXT J
110 NEXT I
120 FOR K=1 TO N
130 FOR J=1 TO K
150 PRINT TAB(4*J);A(K,J);
160 NEXT J
170 PRINT
180 NEXT K
190 PRINT
200 END
```

14. 魔 方 阵

n^2 个不同的正整数按方阵形排列，它的每一行、每一列和对角线的各元素之和相等，这个方阵称魔方阵。由自然数 1 到 n^2 构成的魔方阵是最普通的。现作奇数位的魔方阵。

你如打入“3”，表示要作 3×3 的魔方阵，打入 9，表示要作 9×9 的魔方阵。计算机除了打印出魔方阵外，还告诉你这个魔方阵的每行（或列）各元素之和是多少。如 3×3 的魔方阵，每行之和为 15。

魔方阵中各数的排列规律为：

（1）将“1”放在第一行正中一列。

（2）从“2”起直到 $n\times n$ 为止按下列规则放：

每一个数存放的行数比前一个数的行数减 1，列数则加 1。

（3）如果上一个数的行数是 1，则下一个数的行数为 n（最下一行），如在 5×5 的方阵中 1 在第一行，则 2 应放在第五行第四列，3 放在第四行第五列。

（4）当上一个数的列数为 n 时，下一个数的列数应为 1，行数减 1。如 3 在第四行第五列，4 应在第三行第一列。

运行记录如下：

第一次：

```
? 3
    8    1    6
    3    5    7
    4    9    2
    SUM = 15
```

第二次：

```
? 5
    17   24   1    8    15
    23   5    7    14   16
    4    6    13   20   22
    10   12   19   21   3
    11   18   25   2    9
    SUM = 65
```

第三次：

```
? 7
```

```
30  39  48  1   10  19  28
38  47  7   9   18  27  29
46  6   8   17  26  35  37
5   14  16  25  34  36  45
13  15  24  33  42  44  4
21  23  32  41  43  3   12
22  31  40  49  2   11  20
SUM=175
```

```
20  DIM N(15,15)
30  INPUT M
40  LET J=1
50  LET K=(M+1)/2
60  LET M2=M*M
70  FOR I=1 TO M2
80  LET N(J,K)=I
90  LET A=I/M
100 LET B=I-INT(A)*M
110 IF B=0 THEN 210
120 IF J=1 THEN 150
130 LET J=J-1
140 GOTO 160
150 LET J=M
160 IF K=M THEN 190
170 LET K=K+1
180 GOTO 250
190 LET K=1
200 GOTO 250
```

```
210 IF J< >M THEN 240
220 LET J=1
230 GOTO 250
240 LET J=J+1
250 NEXT I
265 T=0
270 FOR I=1 TO M
275 LET T=T+N(I,I)
280 FOR J=1 TO M
290 PRINT TAB(J*4); N(I,J);
300 NEXT J
310 PRINT
320 NEXT I
325 PRINT
330 PRINT TAB(4);"SUM=";T
335 PRINT
340 END
```

15。 转圈的数字

将1，2，3，……n^2 这样一组连续的自然数按下面形式打印出来，各数的顺序是转圈排列的。

1	16	15	14	13
2	17	24	23	12
3	18	25	22	11
4	19	20	21	10
5	6	7	8	9

程序为：

```
10  DIM A (19,19)
20  INPUT N1
30  M=1
40  N=1/2*(N1-1)
50  FOR K=1 TO N
60  K1=K+1
70  T=N1-(K-1)
80  N2=N1-K
90  FOR  I=K TO T
100 A(I,K)=M
110 M=M+1
120 NEXT I
130 FOR J=K1 TO T
140 A(T,J)=M
150 M=M+1
160 NEXT J
170 FOR I1=K TO N2
180 I=N1-I1
190 A(I,T)=M
200 M=M+1
210 NEXT I1
220 FOR J1=K1 TO N2
230 J=N2-J1+K1
240 A(K,J)=M
250 M=M+1
260 NEXT J1
```

```
270 NEXT K
280 A(N+1,N+1)=M
290 FOR I=1 TO N1
300 FOR J=1 TO N1
310 PRINT TAB(4*J);A(I,J);
320 NEXT J
330 PRINT
340 NEXT I
350 END
```

从键盘输入一个值给 N1，表示要打印的方阵每边有几个数。如 N=7，每边有 7 数，方阵共有 7×7=49 个数。

运行记录：

```
?  7    (要求打印 7×7 的方阵)
1  24  23  22  21  20  19
2  25  40  39  38  37  18
3  26  41  48  47  36  17
4  27  42  49  46  35  16
5  28  43  44  45  34  15
6  29  30  31  32  33  14
7   8   9  10  11  12  13
```

16. 哥德巴赫猜想

根据哥德巴赫猜想，任何一个偶数都可以分解为两个素数（质数）之和。这个程序能将给定的任一偶数分解为两个素数。

程序为：

```
10  X=1
20  INPUT N
30  X=X+1
35  IF X=2 THEN 70
40  FOR P=2 TO SQR(X)
50  IF X/P=INT(X/P) THEN 30
60  NEXT P
70  Y=N-X
75  IF Y=2 THEN 110
80  FOR P=2 TO SQR(Y)
90  IF Y/P=INT(Y/P) THEN 30
100 NEXT P
110 PRINT N;"=";X;"+"; Y
115 PRINT
120 GOTO 10
```

程序开始运行后，你打入一个偶数。

```
? 100            (打入 100)
100=3+97
? 86
86=3+83
? 50
50=3+47
⋮
```

可以把 4 到任一偶数之间的每一偶数分解为两个素数之和并打印出来。

如：

4 = 2 + 2	6 = 3 + 3	8 = 3 + 5	10 = 3 + 7
12 = 5 + 7	14 = 3 + 11	16 = 3 + 13	18 = 5 + 13
20 = 3 + 17	22 = 3 + 19	24 = 5 + 19	26 = 3 + 23
28 = 5 + 23	30 = 7 + 23	32 = 3 + 29	34 = 3 + 31

⋮

```
5   INPUT N
10  FOR I=4 TO N STEP 2
20  X=1
30  X=X+1
35  IF X=2 THEN 70
40  FOR P=2 TO SQR(X)
50  IF X/P=INT(X/P) THEN 30
60  NEXT P
70  Y=N-X
75  IF Y=2 THEN 110
80  FOR P=2 TO SQR(Y)
90  IF Y/P=INT(Y/P) THEN 30
100 NEXT P
110 PRINT N; "=";X; "+"; Y
120  END
```

17. 火车和汽车

这是给中学生出的计算“时间—速度—距离”关系的算术游戏题目。已知距离＝速度×时间，计算机可能出如下题目：一个小汽车的时速为 54 哩/时，火车时速为 36 哩/时，在一次旅行中小汽车比火车快 11 小时。问小汽车走了多少小时？从代数可知：假如设小汽车走了 X 小时，则有：

$$54X = 36(X + 11)$$

$$\therefore \quad (54 - 36)X = 36 \times 11 \qquad \therefore \quad X = \frac{36 \times 11}{54 - 36} = 22(\text{时})$$

中学生将算出的结果打入，如果与正确答案误差不超过 5％，则认为对，否则错。计算机还会告诉你：正确答案和你的误差有多大（％）。

```
TRAIN AND CAR

TIME-SPEED DISTANCE EXERCISE

A CAR TRAVELING 54 MPH CAN MAKE A
    CERTAIN TRIP IN
11 HOURS LESS THAN A TRAIN TRAVELING
    AT 36 MPH.
HOW LONG DOES THE TRIP TAKE BY
    CAR? 23
GOOD! ANSWER WITHIN 4 PERCENT.
CORRECT ANSWER IS 22 HOURS.

ANOTHER PROBLEM(YES OR NO)? YES
```

```
A CAR TRAVELING 40 MPH CAN MAKE A
    CERTAIN TRIP IN
14 HOURS LESS THAN A TRAIN TRAVEL-
    ING AT 34 MPH.
HOW LONG DOES THE TRIP TAKE BY
   CAR? 20
SORRY. YOU WERE OFF BY 297 PERCENT.
CORRECT ANSWER IS 79.3333 HOURS.

ANOTHER PROBLEM (YES OR NO)? YES

A CAR TRAVELING 47 MPH CAN MAKE A
    CERTAIN TRIP IN
16 HOURS LESS THAN A TRAIN TRAVEL-
    ING AT 22 MPH.
HOW LONG DOES THE TRIP TAKE BY
    CAR?14
GOOD! ANSWER WITHIN 1 PERCENT.
CORRECT ANSWER IS 14.08 HOURS.

ANOTHER PROBLEM(YES OR NO)? NO
```

程序为:

```
1    PRINT TAB(13);"TRAIN AND CAR"
3    PRINT
4    PRINT"TIME-SPEED DISTANCE EXERCISE"
6    PRINT
10   C=INT(25*RND(0))+40
15   D=INT(15*RND(0))+5
20   T=INT(19*RND(0))+20
```

```
25  PRINT "A CAR TRAVELING"; C; "MPH
    CAN MAKE A CERTAIN TRIP IN"
30  PRINT D; "HOURS LESS THAN A TRAIN
    TRAVELING AT"; T; "MPH."
35  PRINT "HOW LONG DOES THE TRIP TAKE
    BY CAR";
40  INPUT A
45  V=D*T/(C-T)
50  E=INT(ABS((V-A)*100/A)+.5)
55  IF E>5 THEN 70
60  PRINT "GOOD! ANSWER WITHIN"; E;
    "PERCENT."
65  GOTO 80
70  PRINT "SORRY. YOU WERE OFF BY"; E;
    "PERCENT."
80  PRINT "CORRECT ANSWER IS";V;"HOURS."
90  PRINT
95  PRINT "ANOTHER PROBLEM (YES OR NO)";
100 INPUT A$
105 PRINT
110 IF A$="YES" THEN 10
999 END
```

18. 物 理 测 验

本程序用来测验运动学的基本知识。假设有人把一个球以某一速度从地面向上抛，请你回答以下三个问题：

1. 它的最高点离地面多少米？

2. 多少秒钟后它返回地面？

3. 过了某一时间（秒）后，它的速度是多少？

计算机对你的回答作判断。如果它和应有的计算值相差不超过 15%，则认为“足够接近”，否则将认为“不接近（实际值）”，同时告诉你应有的实际值是多少？你分别回答了以上三个问题后，计算机就统计出你在这三个问题中究竟答对了几个。

```
A BALL IS THROWN UPWARDS AT 35
    METERS PER SECOND.

HOW HIGH WILL IT GO (IN METERS)? 10
NOT EVEN CLOSE....
CORRECT ANSWER IS 61.25

HOW LONG UNTIL IT RETURNS(IN SECONDS)?
    7
CLOSE ENOUGH.
CORRECT ANSWER IS 7

WHAT WILL ITS VELOCITY BE AFTER 4.5
    SECONDS? 20
NOT EVEN CLOSE....
CORRECT ANSWER IS -10

1 RIGHT OUT OF 3.

A BALL IS THROWN UPWARDS AT 25 METERS
    PER SECOND.

HOW HIGH WILL IT GO (IN METERS)? 45
NOT EVEN CLOSE....
CORRECT ANSWER IS 31.25
```

```
HOW LONG UNTIL IT RETURNS
    (IN SECONDS) ? 4
NOT EVEN CLOSE....
CORRECT ANSWER IS 5

WHAT WILL ITS VELOCITY BE AFTER
    3.2 SECONDS? 12
NOT EVEN CLOSE....
CORRECT ANSWER IS -7

0 RIGHT OUT OF 3.
```

程序为：

```
100 PRINT
105 PRINT
106 Q=0
110 V=5+INT(35*RND(0))
111 PRINT "A BALL IS THROWN UPWARDS
    AT"; V; "METERS PER SECOND."
112 PRINT
115 A=.05*V↑2
116 PRINT "HOW HIGH WILL IT GO (IN
    METERS)";
117 GOSUB 500
120 A=V/5
122 PRINT "HOW LONG UNTIL IT RETURNS
    (IN SECONDS)";
124 GOSUB 500
```

```
130 T=1+INT(2*V*RND(0))/10
132 A=V-10*T
134 PRINT "WHAT WILL ITS VELOCITY BE
        AFTER"; T; "SECONDS";
136 GOSUB 500
140 PRINT
150 PRINT Q; "RIGHT OUT OF 3.";
160 IF Q<2 THEN 100
170 PRINT" NOT BAD."
180 GOTO 100
500 INPUT G
502 IF ABS((G-A)/A)<.15 THEN 510
504 PRINT "NOT EVEN CLOSE...."
506 GOTO 512
510 PRINT "CLOSE ENOUGH."
511 Q=Q+1
512 PRINT "CORRECT ANSWER IS "; A
520 PRINT
530 RETURN
999 END
```

19. 找 零 钱

计算机模拟商店的出纳员。你在商店里买好了东西，售货员计算完毕你应付的货款。到收款台付款时，出纳员向计算

机打入你应付的款数和你所交的票额。此时计算机马上会回答：应找回多少钱，并且指出，应拿出十元的、五元的、二元的、一元的、五角的、贰角的、一角的纸币各多少张，五分的、二分的、一分的硬币各多少枚。

程序和打印结果中，“YEN”表示“元”、“JAO”表示“角”、“FEN”表示“分”。

运行记录如下：

I, YOUR FRIENDLY MICROCOMPUTER, WILL DETERMINE
THE CORRECT CHANGE FOR ITEMS COSTING UP $100
COST OF ITEM? 23.21（货款）
AMOUNT OF PAYMENT? 50（付款数）
YOUR CHANGE, $26.79（应找）
2 TEN YEN BILL(S)　（十元二张）
1 FIVE YEN BILL(S)　（五元一张）
1 ONE YEN BILL(S)　（一元一张）
1 FIVE JAO BILL(S)　（五角一张）
1 TWO JAO BILL(S)　（二角一张）
1 FIVE FEN(S)　（五分一枚）
2 TWO FEN(S)　（二分二枚）
THANK YOU, COME AGAIN
COST OF ITEM? 10.92
AMOUNT OF PRYMENT? 20
YOUR CHANGE, $9.08
1 FIVE YEN BILL(S)
4 ONE YEN BILL(S)

```
1 FIVE FEN(S)
1 TWO FEN(S)
1 ONE FEN(S)
THANK YOU, COME AGAIN.
COST OF ITEM? 0.03
AMOUNT OF RAYMENT? 10
YOUR CHANGE, $9.97
1 FIVE YEN BILL(S)
4 ONE YEN BILL(S)
1 FIVE JAO BILL(S)
2 TWO JAO BILL(S)
1 FIVE FEN(S)
1 TWO FEN(S)
THANK YOU, COME AGAIN.
```

程序为:

```
30  PRINT "I, YOUR FRIENDLY MICROCOMPU-
    TER, WILL DETERMINE"
40  PRINT "THE CORRECT CHANGE FOR
    ITEMS COSTING UP TO $100"
50  PRINT
60  PRINT "COST OF ITEM";
70  INPUT A:PRINT "AMOUNT OF PAYMENT";
75  INPUT P
80  C=P-A: M=C: IF C< >0 THEN 110
90  PRINT"CORRECT AMOUNT, THANK YOU."
100 GOTO 60
110 IF C< >0 THEN 140
```

```
120 PRINT "SORRY, YOU HAVE SHORT-
    CHANGED ME $"; A-P
130 GOTO 60
140 PRINT "YOUR CHANGE, $"; C
150 D=INT(C/10)
160 IF D=0 THEN 180
170 PRINT D;" TEN YEN BILL(S)"
180 C=M-(D*10)
190 E=INT(C/5)
200 IF E=0 THEN 220
210 PRINT E;" FIVE YEN BILL(S)"
220 C=M-(D*10+E*5)
230 F=INT(C)
240 IF F=0 THEN 260
250 PRINT F;" ONE YEN BILL(S)"
260 C=M-(D*10+E*5+F)
270 C=C*100
280 N=C
290 G=INT(C/50)
300 IF G=0 THEN 320
310 PRINT G;" FIVE JAO BILL(S)"
320 C=N-(G*50)
330 H=INT(C/20)
340 IF H=0 THEN 360
350 PRINT H;" TWO JAO BILL(S)"
360 C=N-(G*50+H*20)
370 I=INT(C/10)
```

```
380 IF I=0 THEN 400
390 PRINT I;" ONE JAO BILL(S)"
400 C=N-(G*50+H*20+I*10)
410 J=INT(C/5)
420 IF J=0 THEN 440
430 PRINT J;" FIVE FEN(S)"
440 C=N-(G*50+H*20+I*10+J*5)
450 K=INT(C/2)
460 IF K=0 THEN 480
470 PRINT K; " TWO FEN(S)"
480 C=N-(G*50+H*20+I*10+J*5+K*2)
490 L=INT(C+0.5)
500 IF L=0 THEN 520
510 PRINT L;" ONE FEN(S)"
520 PRINT "THANK YOU, COME AGAIN."
540 PRINT
550 GOTO 60
560 END
```

20. 猜数游戏

先由计算机产生一个 1—100 之间的随机整数，你来猜这个数。你每次可以打入两个数，表示要猜的数在此两个数之间。计算机会回答你，该数是在你所指出的范围之内呢，还是大于此两数，或小于此两数。然后你再猜第二次，应争取在六次之内猜出来。最后一次你应打入两个相同的数字，表示此数即是你要猜的数。

下面是运行记录：

```
GUESS # 1 ? 25,75
YOU HAVE TRAPPED MY NUMBER.
GUESS # 2 ? 40,60
MY NUMBER IS SMALLER THAN YOUR TRAP
   NUMBERS。
GUESS # 3 ? 30,37
YOU HAVE TRAPPED MY NUMBER.
GUESS # 4 ? 34,36
YOU HAVE TRAPPED MY NUMBER.
GUESS # 5 ? 35,35
MY NUMBER IS SMALLER THAN YOUR TRAP
   NUMBERS.
GUESS # 6 ? 34,34
YOU GOT IT! ! !
TRY AGAIN.
GUESS # 1 ? 30,80
YOU HAVE TRAPPED MY NUMBER.
GUESS # 2 ? 50,60
MY NUMBER IS SMALLER THAN YOUR TRAP
   NUMBERS。
GUESS # 3 ?  35,45
MY NUMBER IS SMALLER THAN YOUR
   TRAP NUMBERS.
```

```
GUESS # 4 ?  32,34
YOU HAVE TRAPPED MY NUMBER.

GUESS # 5 ?  33,33
MY NUMBER IS SMALLER THAN YOUR
    TRAP NUMBERS.

GUESS # 6? 32,32

YOU GOT IT! ! !
```

程序：

```
10  G=6
20  N=100
30  X=INT(N*RND(0))+1
40  FOR Q=1 TO G
50  PRINT
60  PRINT "GUESS #"; Q;
70  INPUT A,B
80  IF A=B AND X=A THEN 250
90  IF A <=B THEN 110
100 GOSUB 210
110 IF A <=X AND X <=B THEN 170
120 IF X<A THEN 150
130 PRINT "MY NUMBER IS LARGER THAN
    YOUR TRAP NUMBERS."
140 GOTO 180
150 PRINT "MY NUMBER IS  SMALLER  THAN
    YOUR TRAP NUMBERS."
```

```
160 GOTO 180
170 PRINT "YOU HAVE TRAPPED MY
    NUMBER."
180 NEXT Q
190 PRINT "SORRY, THAT'S"; G; "GUESSES.
    NUMBER  WAS"; X
200 GOTO 260
210 R = A
220 A = B
230 B = R
240 RETURN
250 PRINT "YOU GOT IT! ! ! "
260 PRINT
270 PRINT "TRY AGAIN."
280 PRINT
290 GOTO 30
300 END
```

21. 猜 数 谜

你先指定一个整数（L），随后计算机便产生一个从1到这个数之间的随机整数来让你猜。如果你猜的数不是计算机中已经产生的那个数，则计算机会告诉你是大了还是小了，让你再猜，直到猜对为止。你应该用最少的次数就能猜准它。根据你给的整数L的大小，计算机算出一个数值（$\frac{\ln L}{\ln 2}+1$，再取其整数），例如，你打入 200，则$\frac{\ln 200}{\ln 2}=7.6438$，加1再取整，

为8。如果你用小于这个数的次数猜中了，计算机打印出"VERY GOOD."，如果你的次数刚好等于此数，则打印"GOOD"，如果超过此次数，则打印出："YOU SHOULD HAVE BEEN ABLE TO GET IT IN ONLY 8"（你应在8次内猜中）。显然，指定的数愈大，允许猜的次数就愈多。

```
1  PRINT "THIS IS A NUMBER GUESSING
   GAME. I'LL THINK"
5  PRINT "OF A NUMBER BETWEEN 1 AND
   ANY LIMIT YOU WANT."
6  PRINT "THEN YOU HAVE TO GUESS WHAT
   IT IS."
8  PRINT "WHAT LIMIT DO YOU WANT";
9  INPUT L
10 PRINT
11 L1=INT(LOG(L)/LOG(2))+1
12 PRINT "I'M THINKING OF A NUMBER
   BETWEEN 1 AND "; L
13 G=1
14 PRINT "NOW YOU TRY TO GUESS WHAT
   IT IS."
15 M=INT(L*RND(0)+1)
20 INPUT N
21 IF N>0 THEN 25
22 GOSUB 70
23 GOTO 1
25 IF N=M THEN 50
```

```
30  G=G+1
31  IF N>M THEN 40
32  PRINT "TOO LOW. TRY A BIGGER
    ANSWER."
33  GOTO 20
40  PRINT "TOO HIGH. TRY A SMALLER
    ANSWER.":GOTO 20
50  PRINT "THAT'S IT! YOU GOT IT IN"; G;
    "TRIES."
52  IF G<L1 THEN 58
54  IF G=L1 THEN 60
56  PRINT "YOU SHOULD HAVE BEEN ABLE
    TO GET IT IN ONLY"; L1
57  GOTO 65
58  PRINT "VERY";
60  PRINT "GOOD."
65  GOSUB 70
66  GOTO 12
70  FOR H=1 TO 5
71  PRINT:NEXT H
73  RETURN
99  END
```

游戏记录如下：

```
THIS IS A NUMBER GUESSING GAME. I'LL
    THINK
OF A NUMBER BETWEEN 1 AND ANY LIMIT
    YOU WANT.
```

```
THEN YOU HAVE TO GUESS WHAT IT IS.
WHAT LIMIT DO YOU WANT? 200

I'M THINKING OF A NUMBER BETWEEN 1 AND
   200
NOW YOU TRY TO GUESS WHAT IT IS.
? 100
TOO LOW. TRY A BIGGER ANSWER.
? 150
TOO HIGH. TRY A SMALLER ANSWER.
? 112
TOO LOW. TRY A BIGGER ANSWER.
? 118
TOO LOW. TRY A BIGGER ANSWER.
? 123
THAT'S IT! YOU GOT IT IN 5 TRIES.
VERY GOOD.

I'M THINKING OF A NUMBER BETWEEN 1 AND
   200
NOW YOU TRY TO GUESS WHAT IT IS.
? 100
TOO HIGH. TRY A SMALLER ANSWER.
? 75
TOO HIGH. TRY A SMALLER ANSWER.
? 55
TOO HIGH. TRY A SMALLER ANSWER.
```

```
? 45
TOO HIGH. TRY A SMALLER ANSWER.
? 20
TOO HIGH. TRY A SMALLER ANSWER.
? 10
TOO LOW. TRY A BIGGER ANSWER.
? 11
TOO LOW. TRY A BIGGER ANSWER
? 13
TOO LOW. TRY A BIGGER ANSWER,
? 15
TOO LOW. TRY A BIGGER ANSWER.
? 16
TOO LOW. TRY A BIGGER ANSWER
? 17
TOO LOW. TRY A BIGGER ANSWER.
? 19
TOO HIGH. TRY A SMALLER ANSWER
? 18
THAT'S IT! YOU GOT IT IN 13 TRIES.
YOU SHOULD HAVE BEEN ABLE TO GET IT
   IN ONLY 8
```

22. 猜数得分

计算机产生一个 1—100 之间的随机整数，用来表示分数，让你猜。可以连猜六次。如猜对了，你便赢得这些分。再

玩一次，每次将你赢的分累加起来。如六次均猜不到，就把你原有的分数扣光。

```
YOUR GUESS? 50
YOUR GUESS IS TOO HIGH
YOUR GUESS? 25
YOUR GUESS IS TOO HIGH
YOUR GUESS? 12
YOUR GUESS IS TOO HIGH
YOUR GUESS? 6
YOUR GUESS IS TOO HIGH
YOUR GUESS? 3
YOUR GUESS IS TOO LOW
YOUR GUESS? 4
GOT IT !!!!!!!!!! YOU WIN 4.
YOUR TOTAL WINNINGS ARE NOW 4.
PLAY AGAIN (YES OR NO)? YES
YOUR GUESS? 50
YOUR GUESS IS TOO LOW
YOUR GUESS? 75
YOUR GUESS IS TOO HIGH
YOUR GUESS? 62
YOUR GUESS IS TOO HIGH
YOUR GUESS? 57
GOT IT !!!!!!!!!!YOU WIN 57.
YOUR TOTAL WINNINGS ARE NOW 61.
```

```
PLAY AGAIN (YES OR NO)?
SO LONG. HOPE YOU ENJOYED
   YOURSELF!!!
```

程序为：

```
160 R=0
170 B=0: PRINT
180 Y=INT(100*RND(0))
200 PRINT "YOUR GUESS";
210 INPUT A
220 B=B+1
230 IF A=Y THEN 300
240 IF A>Y THEN 270
250 PRINT "YOUR GUESS IS TOO LOW"
260  GOTO 280
270 PRINT "YOUR GUESS IS TOO HIGH"
280 IF B<6 THEN 200
290 PRINT "YOU BLEW IT...TOO BAD... THE
    NUMBER WAS"; Y
295 R=0: GOTO 350
300 PRINT "GOT IT!!!!!!!!!!!   YOU
    WIN"; Y; "."
310 R=R+Y
320 PRINT "YOUR TOTAL WINNINGS ARE
    NOW"; R;"."
350 PRINT :PRINT "PLAY AGAIN (YES OR
    NO)";
360 INPUT A$:IF A$="YES" THEN 170
```

```
380 PRINT:PRINT "SO LONG. HOPE YOU
    ENJOYED YOURSELF!!!"
390 END
```

23. 按"星"数猜数

计算机产生一个 1—100 之间的整数请你来猜。如果你猜的数与此数相距甚远，计算机打印出一个"*",如果比较接近，则打印出几个"*"，七个"*"，表示相当接近。星号愈多表示你猜的数离该数愈接近。

```
DO YOU WANT INSTRUCTIONS? YES
I AM THINKING OF A WHOLE NUMBER
    FROM 1 TO 100
TRY TO GUESS MY NUMBER. AFTER YOU
    GUESS, I
WILL TYPE ONE OR MORE STARS (*). THE
    MORE
STARS I TYPE, THE CLOSER YOU ARE TO
    MY NUMBER.
ONE STAR (*) MEANS FAR AWAY, SEVEN
    STARS (*******)
MEANS REALLY CLOSE! YOU BET 7 GUESSES.

OK, I AM THINKING OF A NUMBER, START
    GUESSING.
YOUR GUESS? 50
***
YOUR GUESS? 25
*********************!!!
```

```
YOU GOT IT IN 2 GUESSES! ! ! LET'S PLAY
        AGAIN...
OK, I AM THINKING OF A NUMBER, START
     GUESSING.
YOUR GUESS? 50
* * *
YOUR GUESS? 75
* *
YOUR GUESS? 25
* * * * *
YOUR GUESS? 15
* * *
YOUR GUESS? 35
* * * * * *
YOUR GUESS? 38
* * * * *
YOUR GUESS? 33
* * * * * * *
SORRY, THAT'S 7 GUESSES, NUMBER WAS 32
OK, I AM THINKING OF A NUMBER, START
     GUESSING.
YOUR GUESS? 50
* * *
YOUR GUESS? 75
* *
```

```
YOUR GUESS? 25
* * * * *
YOUR GUESS? 35
* * * * *
YOUR GUESS? 30
* * * * * * *
YOUR GUESS? 31
* * * * * * * * * * * * * * * * * * * * ! ! !
YOU GOT IT IN 6 GUESSES! ! ! LET'S
    PLAY AGAIN...
```

程序为:

```
100 REM *** STARS-PEOPLE'S COMPUTER
    CENTER
140 REM *** A IS LIMIT ON NUMBER, M
    IS NUMBER OF GUESSES
150 A=100:M=7
170 INPUT "DO YOU WANT INSTRUCTIONS";A$
190 IF LEFT$(A$,1)="N" THEN 280
200 REM *** INSTRUCTIONS ON HOW TO
    PLAY
210 PRINT "I AM THINKING OF A WHOLE
    NUMBER FROM 1 TO"; A
220 PRINT "TRY TO GUESS MY NUMBER.
    AFTER YOU GUESS, I"
230 PRINT "WILL TYPE ONE OR MORE STARS
      (*). THE MORE"
```

```
240 PRINT "STARS I TYPE, THE CLOSER YOU
    ARE TO MY NUMBER."
250 PRINT "ONE STAR (*) MEANS FAR AWAY,
    SEVEN STARS (* * * * * * *)"
260 PRINT "MEANS REALLY CLOSE! YOU
    GET";M;"GUESSES."
270 REM * * * COMPUTER THINKS OF A
    NUMBER
280 PRINT
290 PRINT
300 X=INT(A*RND(0)+1)
310 PRINT "OK,I AM THINKING OF A NUMBER,
    START GUESSING."
320 REM * * * GUESSING BEGINS, HUMAN
    BETS M GUESSES
330 FOR K=1 TO M
340 PRINT
350 PRINT "YOUR GUESS";
360 INPUT G
370 IF G=X THEN 600
380 D=ABS(G-X)
390 IF D>=64 THEN 510
400 IF D>=32 THEN 500
410 IF D>=16 THEN 490
420 IF D>=8 THEN 480
430 IF D>=4 THEN 470
440 IF D>=2 THEN 460
```

```
450 PRINT "*";
460 PRINT "*";
470 PRINT "*";
480 PRINT "*";
490 PRINT "*";
500 PRINT "*";
510 PRINT "*";
520 PRINT
530 NEXT K
540 REM * * * DID NOT GUESS IN M GUESSES
550 PRINT
560 PRINT "SORRY, THAT'S"; M; "GUESSES,
    NUMBER WAS"; X
580 GOTO 280
590 REM * * * WE HAVE A WINNER
600 FOR N=1 TO 20
610 PRINT "*";
620 NEXT N
630 PRINT "! ! ! "
640 PRINT  'OU GOT IT IN"; K; "GUESSES!!!
    LET'S PLAY AGAIN..."
650 GOTO 280
660 END
```

24. 得分和失分

每次计算机产生五个 1—5 之间的随机整数（每次的五个

数不同）。第一个随机整数表示给你减5分，第二个数字表示加5分，第三个数字表示给你加一倍分数，此时计算机将打印出“YOU HIT THE JACKPOT！！！，第四个数字表示给你加1分，第五个数字表示减去你一半分数。你原来有 100 分，让你打入一个 1—5 之间的数字，若打入的数字和计算机产生的第几个数相同，则按它的含义对你加或减分。当你的分数超过 500 分时，你就胜利！

譬如，某一次计算机产生的五个随机数是：4、2、3、1、5，你打入的是“1”，与第四个数相同，给你加一分。如果你打入“4”，则与第一个相同，应减去5分。

```
YOU HAVE 100 POINTS. BY GUESSING
    NUMBERS FROM 1 TO 5, YOU
CAN GAIN OR LOSE POINTS DEPENDING
    UPON HOW CLOSE YOU GET TO
A RANDOM NUMBER SELECTED BY THE
    COMPUTER.
YOU OCCASIONALLY WILL GET A JACKPOT
    WHICH WILL DOUBLE(!)
YOUR POINT COUNT. YOU WIN WHEN YOU
    GET 500 POINTS.
GUESS A NUMBER FROM 1 TO 5? 2
YOU HAVE 95 POINTS.
GUESS A NUMBER FROM 1 TO 5? 2
YOU HAVE 90 POINTS.
GUESS A NUMBER FROM 1 TO 5?  2
YOU HAVE 95 POINTS.
GUESS A NUMBER FROM 1 TO 5? 2
```

```
YOU HAVE 96 POINTS.
GUESS A NUMBER FROM 1 TO 5? 2
YOU HIT THE JACKPOT!!!
YOU HAVE 192 POINTS.
GUESS A NUMBER FROM 1 TO 5? 3
YOU HIT THE JACKPOT! ! !
YOU HAVE 384 POINTS.
GUESS A NUMBER FROM 1 TO 5? 1
YOU HAVE 389 POINTS.
GUESS A NUMBER FROM 1 TO 5? 2
YOU HAVE 394 POINTS.
GUESS A NUMBER FROM 1 TO 5? 5
YOU HIT THE JACKPOT! ! !
! ! ! ! YOU WIN! ! ! ! WITH 788 POINTS.
```

程序为：

```
4  PRINT "YOU HAVE 100 POINTS. BY
   GUESSING NUMBERS FROM 1 TO 5, YOU"
5  PR NT "CAN GAIN OR LOSE POINTS
   DEPENDING UPON HOW CLOSE YOU  GET
   TO"
6  PR NT "A RANDOM NUMBER SELECTED
   BY THE COMPUTER.": PRINT
7  PRINT "YOU OCCASIONALLY WILL GET A
   JACKPOT WHICH WILL DOUBLE(!)"
8  PRINT "YOUR POINT COUNT. YOU WIN
   WHEN YOU GET 500 POINTS."
9  PRINT: P=100
```

```
10  DEF FNR(X)=INT(5*RND(0)+1)
12  INPUT "GUESS A NUMBER FROM 1 TO 5";
    G
15  R=FNR(1)
16  S=FNR(1)
17  T=FNR(1)
18  U=FNR(1)
19  V=FNR(1)
20  IF G=R THEN 30
21  IF G=S THEN 40
22  IF G=T THEN 50
23  IF G=U THEN 60
24  IF G=V THEN 70
25  GO TO 12
30  P=P-5
35  GOTO 80
40  P=P+5
45  GOTO 80
50  P=P+P
53  PRINT "YOU HIT THE JACKPOT!!!"
55  GOTO 80
60  P=P+1
65  GOTO 80
70  P=P-INT(P*.5)
80  IF P>500 THEN 90
82  PRINT "YOU HAVE"; P; "POINTS."
85  GOTO 12
```

```
90  PRINT "! ! ! ! YOU WIN! ! ! !  WITH";
    P; "POINTS."
99  END
```

25. 计算机猜数

你想好一个数，将它加 3，再除以 5，再乘以 8，再除以 5，再加 5，再减 1，然后将最终的结果告诉计算机，计算机会猜出你心中想的那个数是多少。例如，你打入 12（最后计算的结果），计算机猜出你心中想的数是 22 并问你对不对。如果你回答对（“YES”），此游戏就结束了。如果你想欺骗计算机，回答说不对（“NO”），则计算机会问你，你心中的数是多少？如果你不如实地告诉计算机而乱编一个数（如32），则计算机会驳斥你，并将此数（32）加 3，除以 5，乘 8，除以 5，加 5 减 1 来证明它并不等于 12。最后再问“这回你应该相信我了吧？”如你还打入“NO”与计算机不合作，则计算机会说：“你激怒我了”。

```
TAKE A NUMBER AND ADD 3. DIVIDE THIS
  NUMBER BY 5 AND
MULTIPLY BY 8. DIVIDE BY 5 AND ADD THE
  SAME. SUBTRACT 1.
WHAT DO YOU HAVE? 12
I BET YOUR NUMBER WAS 22 WAS I RIGHT?NO
WHAT WAS YOUR ORIGINAL NUMBER? 32
SO YOU THINK YOU'RE SO SMART, EH?
NOW WATCH.
32  PLUS 3 EQUALS 35. THIS DIVIDED BY 5
      EQUALS 7;
```

THIS TIMES 8 EQUALS 56. IF WE DIVIDE BY
5 AND ADD 5,
WE GET 16.2, WHICH, MINUS 1 EQUALS 15.2.
NOW DO YOU BELIEVE ME? NO
YOU HAVE MADE ME MAD! ! !
#######################
I HOPE YOU BELIEVE ME NOW, FOR YOUR
SAKE! !

程序为：

```
60  PRINT " TAKE A NUMBER AND ADD 3.
    DIVIDE THIS NUMBER BY 5 AND"
70  PRINT "MULTIPLY BY 8. DIVIDE BY 5
    AND ADD THE SAME. SUBTRACT 1."
80  PRINT "WHAT DO YOU HAVE";
90  INPUT B
100 LET C=(B+1-5)*5/8*5-3
110 PRINT "I BET YOUR NUMBER WAS ";
    C;" WAS I RIGHT";
120 INPUT D$
130 IF D$="YES" THEN 510
140 PRINT "WHAT WAS YOUR ORIGINAL
    NUMBER";
150 INPUT K
155 LET F=K+3
160 LET G=F/5
170 LET H=G*8
180 LET I=H/5+5
```

```
190 LET J = I - 1
200 PRINT "SO YOU THINK YOU'RE SO
    SMART, EH? "
210 PRINT "NOW WATCH."
230 PRINT K; "PLUS 3 EQUALS"; F;". THIS
    DIVIDED BY 5 EQUALS";G;"; "
240 PRINT "THIS TIMES 8 EQUALS";H;".IF
    WE DIVIDE BY 5 AND ADD 5,"
250 PRINT "WE GET";I;", WHICH, MINUS 1
    EQUALS" ;J;"."
260 PRINT "NOW DO YOU BELIEVE ME";
270 INPUT Z$
290 IF Z$ = "YES" THEN 510
295 PRINT "YOU HAVE MADE ME MAD!!!"
450 PRINT"#######################"
470 PRINT "I HOPE YOU BELIEVE ME NOW,
    FOR YOUR SAKE!!"
480 GOTO 520
510 PRINT "BYE!!!!!"
520 END
```

26. 猜 字 母

计算机选好一个 A—Z 之间的字母来让你猜。打入你猜的一个字母，随后计算机便告诉你打入的字母与计算机选的那个字母相比是高还是低（以 A为最低，Z 为最高），看你几次猜中。

LETTER GUESSING GAME
I'LL THINK OF A LETTER OF THE
    ALPHABET, A TO Z
TRY TO GUESS MY LETTER AND I'LL
    GIVE YOU CLUES
AS TO HOW CLOSE YOU'RE GETTING TO
    MY LETTER.

O.K., I HAVE A LETTER. START
    GUESSING

WHAT IS YOUR GUESS? N

TOO HGH. TRY A LOWER LETTER.
WHAT IS YOUR GUESS? F

YOU GOT IT 2 GUESSES!!
GOOD JOB!!!!!

LET'S PLAY AGAIN.....

O.K., I HAVE A LETTER. START
    GUESSING.
WHAT IS YOUR GUESS? M
TOO HIGH. TRY A LOWER LETTER.
WHAT IS YOUR GUESS? F
TOO HIGH. TRY A LOWER LETTER.
WHAT IS YOUR GUESS? C
TWO LOW. TRY A HIGHER LETTER.
WHAT IS YOUR GUESS? E

```
TOO HIGH. TRY A LOWER LETTER.
WHAT IS YOUR GUESS? D
YOU GOT IT IN 5 GUESSES!!
GOOD JOB !!!!!
LET'S PLAY AGAIN.....
O.K., I HAVE A LETTER. START
   GUESSING
WHAT IS YOUR GUESS?
```

```
10  PRINT "LETTER GUESSING GAME"
20  PRINT "I'LL THINK OF A LETTER OF
      THE ALPHABET, A TO Z."
30  PRINT "TRY TO GUESS MY LETTER AND
      I'LL GIVE YOU CLUES"
40  PRINT "AS TO HOW CLOSE YOU'RE GET-
    TING TO MY LETTER."
50  L=65+INT(RND(0)*26)
60  G=0
70  PRINT
80  PRINT "O.K., I HAVE A LETTER.
      START GUESSING."
90  PRINT
100 PRINT "WHAT IS YOUR GUESS";
110 G=G+1
120 INPUT A$
130 A=ASC(A$)
140 IF A=L THEN 180
```

```
150 IF A<L THEN 170
160 PRINT "TOO LOW.TRY A HIGHER
      LETTER。": GOTO 100
170 PRINT "TOO HIGH. TRY A LOWER
      LETTER.": GOTO 100
180 PRINT "YOU GOT IT IN"; G; "GUESSES!!"
190 IF G<= 5 THEN 220
200 PRINT "BUT IT SHOULDN'T TAKE MORE
      THAN 5 GUESSES!"
210 GOTO 230
220 PRINT "GOOD JOB !!!!!"
230 PRINT
240 PRINT "LET'S AGAIN....."
250 GOTO 50
999 END
```

27. 猜英语单词

计算机产生一个含五个字母的英语单词来让你猜。你可打入五个字母，计算机会告诉你：有几个字母与该字中的字母相同，并告诉你哪一个字母不仅字母相同而且位置也相同。你可以再打入另外五个字母，计算机也都如此处理，直到你猜对此字为止。你未猜对，而不想再猜了，可打入问号"？"，计算机会再出一个新字让你猜。

可以改变 530 和 540 语句来改变可能产生的英语单词。

I AM THINKING OF A WORD —YOU GUESS IT.
I WILL GIVE YOU CLUES TO HELP YOU GET IT.

GOOD LUCK!!

YOU ARE STARTING A NEW GAME...
GUESS A FIVE LETTER WORD? ABCDE
THERE WERE 3 MATCHES AND THE COMMON
  LETTERS WERE...CAD (C, A, D 三个字母相同)
FROM THE EXACT LETTER MATCHES. YOU
  KNOW................---D- (D 的位置也相同)

GUESS A FIVE LETTER WORD? FGHIJ
THERE WERE 0 MATCHES AND THE COMMON
  LETTERS WERE...
FROM THE EXACT LETTER MATCHES, YOU
  KNOW................---D-

IF YOU GIVE UP, TYPE '?' FOR YOUR NEXT
  GUESS.
GUESS A FIVE LETTER WORD? LMNOP
THERE WERE 1 MATCHES AND THE COMMON
  LETTERS UERE...N
FROM THE EXACT LETTER MATCHES, YOU
  KNOW..............--ND- (N,D 的位置猜对)

IF YOU GIVE UP, TYPE '?' FOR YOUR NEXT
  GUESS.
GUESS A FIVE LETTER WORD? CANDY
THERE UERE 5 MATCHES AND THE COMMON
  LETTERS WERE...CANDY
FROM THE EXACT LETTER MATCHES. YOU

```
KNOW................CANDY
YOU HAVE GUESSED THE WORD. IT TOOK 4
   GUESSES!

WANT TO PLAY AGAIN? YES
YOU ARE STARTING A NEW GAME...
GUESS A FIVE LETTER WORD? ABCDE
THERE WERE 0 MATCHES AND THE COMMON
   LETTERS WERE...
FROM THE EXACT LETTER MATCHES, YOU
   KNOW................

IF YOU GIVE UP, TYPE '? ' FOR YOUR NEXT
   GUESS.

GUESS A FIVE LETTER WORD? FGHIJ
THERE WERE 2 MATCHES AND THE COMMON
   LETTERS WERE...FI
FROM THE EXACT LETTER MATCHES, YOU
   KNOW................F----

GUESS A FIVE LETTER WORD? MNOPS
THERE WERE 1 MATCHES AND THE
   COMMON LETTERS WERE...S
FROM THE EXACT LETTER MATCHES, YOU
   KNOW................F----

IF YOU GIVE UP, TYPE '? ' FOR YOUR NEXT
   GUESS.

GUESS A FIVE LETTER WORD? FISTS
```

THERE WERE 5 MATCHES AND THE COMMON
    LETTERS WERE...FISST
FROM THE EXACT LETTER MATCHES, YOU
    KNOW.................FI---

GUESS A FIVE LETTER WORD? FIRST
THERE WERS 5 MATCHES AND THE
    COMMON LETTERS WERE...FIRST
FROM THE EXACT LETTER MATCHES, YOU
    KNOW.................FIRST
YOU HAVE GUESSED THE WORD. IT TOOK 5
        GUESSES!
WANT TO PLAY AGAIN? NO

程序为：

```
5   DIM S(7), A(7), L(7), D(7), P(7)
10  PRINT "I AM THINKING OF A WORD --
    YOU GUESS IT."
15  PRINT "I WILL GIVE YOU CLUES TO HELP
    YOU GET IT."
18  PRINT"GOOD LUCK! ! ":
30  PRINT: PRINT "YOU ARE STARTING A
    NEW GAME..."
35  RESTORE
40  READ N
50  C=INT(RND(0)*N+1)
60  FOR I=1 TO C
```

```
70  READ S$
80  NEXT I
90  G=0
95  S(0)=LEN(S$)
100 FOR I=1 TO LEN(S$): S(I)=ASC(MID$(S$,
    I, 1)): NEXT I
110 FOR I=1 TO 5
120 A(I)=45
130 NEXT I
140 FOR J=1 TO 5
144 P(J)=0
146 NEXT J
150 PRINT "GUESS A FIVE LETTER WORD";
160 INPUT L$
170 G=G+1
172 IF S$=G$ THEN 500
173 FOR I=1 TO 7:  P(I)=0: NEXT I
175 L(0)=LEN(L$)
180 FOR I=1 TO LEN(L$): L(I)=ASC(MID$
    (L$,I, 1)): NEXT I
190 IF L(1)=63 THEN 300
200 IF L(0)< >5 THEN 400
205 M=0: Q=1
210 FOR I=1 TO 5
220 FOR J=1 TO 5
230 IF S(I)< >L(J) THEN 260
231 P(Q)=L(J)
```

```
232 Q=Q+1
233 IF K<>J THEN 250
240 A(J)=L(J)
250 M=M+1
260 NEXT J
265 NEXT I
270 A(0)=5
272 P(0)=M
275 A$="": FOR I=1 TO A(0): A$=A$+CHR$
    (A(I)): NEXT I
277 P$=" ": FOR I=1 TO P(0): P$=P$+CHR$
    (P(I)): NEXT I
280 PRINT "THERE WERE";M;"MATCHES AND
    THE COMMON LETTERS WERE...": P$
285 PRINT "FROM THE EXACT LETTER
    MATCHES, YOU KNOW................";A$
286 IF A$=S$ THEN 500
287 IF M>1 THEN 289
288 PRINT: PRINT "IF YOU GIVE UP, TYPE
    '? ' FOR YOUR NEXT GUESS."
289 PRINT
290 GOTO 150
300 S$="":FOR I=1 TO 7:S$=S$+CHR$(S(I)):
    NEXT I
310 PRINT "THE SECRET WORD IS "; S$
315 PRINT
320 GOTO 30
400 PRINT "YOU MUST GUESS A 5 LETTER
```

```
    WORD. START AGAIN."
410 PRINT: G=G-1:  GOTO 150
500 PRINT "YOU HAVE GUESSED THE WORD.
    IT TOOK"; G; "GUESSES! ": PRINT
510 INPUT "WANT TO PLAY AGAIN"; Q$
520 IF Q$="YES" THEN 30
530 DATA 12, "DINKY", "SMOKE", "WATER",
    "GRASS", "TRAIN", "MIGHT", "FIRST"
540 DATA "CANDY", "CHAMP", "WOULD",
    "CLUMP", "DOPEY"
999 END
```

28. 对位猜数

首先，计算机会显示出："好，我已经想好了一个三位数，请你猜吧"！（O.K. I HAVE A NUMBER IN MIND, TRY TO GUESS.）这是一个三位随机整数，但在这三位数中不能有两个数字是相同的。你最多可以猜 20 次。每猜完一次，计算机会告诉你如下的线索：

PICO：表示猜对了一位，但位置不对。

FERMI：表示猜对了一位，而且位置也对。

BAGELS：表示没有一位猜对。

你能以最少的次数猜到这个三位数吗？如果你的方法巧妙得当，用不到八次就能猜中。

```
WOULD YOU LIKE THE RULES (YES OR NO)?
    YES
I AM THINKING OF A THREE-DIGIT NUMBER.
    TRY TO GUESS
```

```
MY NUMBER AND I WILL GIVE YOU CLUES
   AS FOLLOWS:
  PICO  - ONE DIGIT CORRECT BUT IN THE
        WRONG POSITION
  FERMI  - ONE DIGIT CORRECT AND IN THE
        RIGHT POSITION
  BAGELS  - NO DIGITS CORREET
O.K. I HAVE A NUMBER IN MIND.
GUESS # 1          ? 123
FERMI
GUESS # 2          ? 724
PICO FERMI
GUESS # 3          ? 827
FERMI FERMI
GUESS # 4          ? 927
FERMI FERMI
GUESS # 5          ? 627
YOU GOT IT! ! !
PLAY AGAIN (YES OR NO)? YES
O.K. I HAVE A NUMBER IN MIND.
GUESS # 1          ? 987
BAGELS
GUESS # 2          ? 654
PICO
GUESS # 3          ? 236
PICO PICO
GUESS # 4          ? 613
```

```
PICO
GUESS # 5            ? 327
FERMI FERMI
GUESS # 6            ? 328
FERMI FERMI
GUESS # 7            ? 329
FERMI FERMI
GUESS # 8            ? 325
YOU GOT IT! ! !

PLAY AGAIN (YES OR NO)? YES

O.K. I HAVE A MUMBER IN MIND.
GUESS # 1            ? 456
PICO
GUESS # 2            ? 123
FERMI
GUESS # 3            ? 167
YOU GOT IT! ! !

PLAY AGAIN (YES OR NO)? YES

O.K. I HAVE A NUMBER IN MIND.
GUESS # 1            ? 159
BAGELS
GUESS # 2            ? 247
PICO
GUESS # 3            ? 328
BAGELS
GUESS # 4            ? 476
```

```
PICO FERMI
GUESS # 5          ? 407
PICO FERMI
GUESS # 6          ? 740
PICO FERMI
GUESS # 7          ? 704
PICO PICO
GUESS # 8          ? 406
PICO PICO FERMI
GUESS # 9          ? 604
PICO PICO PICO
GUESS # 10         ? 460
YOU GOT IT!!!
PLAY AGAIN (YES OR NO)? NO
A 4 POINT BAGELS BUFF!!
HOPE YOU HAD FUN. BYE.
```

程序为：

```
10  DIM A1(6), A(3), B(3)
30  Y=0: T=255
70  INPUT "WOULD YOU LIKE THE RULES
    (YES OR NO)"; A$
90  IF LEFT$(A$, 1)= "N" THEN 150
100 PRINT: PRINT "I AM THINKING OF A
    THREE-DIGIT NUMBER. TRY TO GUFSS"
110 PRINT "MY NUMBER AND I WILL GIVE YOU
    CLUES AS FOLLOWS: "
120 PRINT " PICO -ONE DIGIT CORRECT BUT
```

```
    IN THE WRONG POSITION"
130 PRINT " FERMI -ONE DIGIT CORRECT AND
    IN THE RTGHT POSITION"
140 PRINT "  BAGELS-NO DIGITS CORRECT"
150 FOR I=1 TO 3
160 A(I)=INT(10*RND(0))
165 IF I-1=0 THEN 200
170 FOR J=1 TO I-1
180 IF A(I)=A(J) THEN 160
190 NEXT J
200 NEXT I
210 PRINT: PRINT "O.K. I HAVE A NUMBER
    IN MIND."
220 FOR I=1 TO 20
230 PRINT "GUESS # "; I,
240 INPUT A$
245 IF LEN(A$)< >3 THEN 630
250 FOR Z=1 TO 3: A1(Z)=ASC(MID$(A$, Z,
    1)): NEXT Z
260 FOR J=1 TO 3
270 IF A1(J)<48 THEN 300
280 IF A1(J)>57 THEN 300
285 B(J)=A1(J)-48
290 NEXT J
295 GOTO 320
300 PRINT "WHAT? "
310 GOTO 230
320 IF B(1)=B(2) THEN 650
```

```
330 IF B(2)=B(3) THEN 650
340 IF B(3)=B(1) THEN 650
350 C=0:D=0
360 FOR J=1 TO 2
370 IF A(J)< >B(J+1) THEN 390
380 C=C+1
390 IF A(J+1)< >B(J) THEN 410
400 C=C+1
410 NEXT J
420 IF A(1)< >B(3) THEN 440
430 C=C+1
440 IF A(3)< >B(1) THEN 460
450 C=C+1
460 FOR J=1 TO 3
470 IF A(J)< >B(J) THEN 490
480 D=D+1
490 NEXT J
500 IF D=3 THEN 680
505 IF C=0 THEN 545
520 FOR J=1 TO C
540 PRINT "PICO";
540 NEXT J
545 IF D=0 THEN 580
550 FOR J=1 TO D
560 PRINT "FERMI ";
570 NEXT J
580 IF C+D< >0 THEN 600
```

```
590 PRINT "BAGELS";
600 PRINT
605 NEXT I
610 PRINT "OH WELL"
615 PRINT "THAT'S TWENTY GUESSES. MY
    NUMBER WAS"; 100*A(1)+10*A(2)+A(3)
620 GOTO 700
630 PRINT "TRY GUESSING A THREE-DIGIT
    NUMBER.": GOTO 230
650 PRINT "OH, I FORGOT TELL YOU THAT
    THE NUMBER I HAVE IN MIND"
660 PRINT "HAS NO TWO DIGITS THE SAME."
670 GOTO 230
680 PRINT "YOU GOT IT! ! ! ": PRINT
690 Y=Y+1
700 INPUT "PLAY AGAIN (YES OR NO)"; A$
620 IF A$="YES" THEN 150
730 IF Y=0 THEN 750
740 PRINT: PRINT "A"; Y; "POINT BAGELS
    BUFF! ! "
750 PRINT "HOPE YOU HAD FUM. BYE."
999 END
```

29. 猜一组数

你随便选三十个数（它们是 0、1 或 2）任意排列，分成三组（每十个一组）。第一次将十个数（第一批）输入给计算

机，由计算机猜。计算机猜十个数，依次与你的十个数比较，看猜对多少？计算机会将结果（对或错）打印出来，并统计对的次数。接着猜第二组数，第三组数。

如果“运气”好的话，计算机会猜对 1/3 以上。猜对 1/3 的话计算机就“胜利”了。

```
TEN  NUMBERS, PLEASE?  1,0,2,1,1,0,1,1,2,2
```

（你打入十个数）

MY GUESS（我猜）	YOUR NO.（你的数）	RESULT（结果）	NO.RIGHT（对的次数）
0	1	WRONG	0
0	0	RIGHT	1
1	2	WRONG	1
0	1	WROHG	1
1	1	RIGHT	2
1	0	WRONG	2
0	1	WRONG	2
1	1	RIGHT	3
0	2	WRONG	3
0	2	WRONG	3

```
TEN NUMBERS, PLEASE? 2,0,2,0,1,1,2,0,0,0
```

MY GUESS	YOUR NO.	RESULT	NO. RIGHT
2	2	RIGHT	4
2	0	WRONG	4
2	2	RIGHT	5
0	0	RIGHT	6
1	1	RIGHT	7
1	1	RIGHT	8
2	2	RIGHT	9
2	0	WRONG	9
2	0	WRONG	9
2	0	WRONG	9

TEN NUMBERS, PLEASE? 0,1,0,2,0,0,0,2,1,1

MY GUESS	YOUR NO.	RESULT	NO.RIGHT
2	0	WRONG	9
2	1	WRONG	9
2	0	WRONG	9
2	2	RIGHT	10
0	0	RIGHT	11
1	0	WRONG	11
1	0	WRONG	11
1	2	WRONG	11
1	1	RIGHT	12
1	1	RIGHT	13

I GUESSED MORE THAN 1/3 OF YOUR NUMBERS.
I WIN.

DO YOU WAMT TO TRY AGAIN(1 FOR YES, 0
FOR NO)? 1

TEN NUMBERS, PLEASE? 0,0,0,0,0,0,1,1,1,1

MY GUESS	YOUR NO.	RESULT	NO. RIGHT
0	0	RIGHT	1
2	0	WRONG	1
1	0	WRONG	1
2	0	WRONG	1
2	0	WRONG	1
2	0	WRONG	1
0	1	WRONG	1
2	1	WRONG	1
0	1	WRONG	1
2	1	WRONG	1

TEN NUMBERS, PLEASE? 2,2,2,1,1,1,1,1,1,1

```
MY GUESS   YOUR NO.   RESULT   NO. RIGHA

   0          2        WRONG     1
   1          2        WRONG     1
   1          2        WRONG     1
   2          1        WRONG     1
   1          1        RIGHT     2
   2          1        WRONG     2
   0          1        WRONG     2
   2          1        WRONG     2
   2          1        WRONG     2
   1          1        RIGHT     3

TEN NUMBERS, PLEASE? 0,2,0,2,1,0,1,0,1,1


MY GUESS   YOUR NO.   RESULT   NO.RIGHT

   2          0        WRONG     3
   0          2        WRONG     3
   2          0        WRONG     3
   2          2        RIGHT     4
   2          1        WRONG     4
   1          0        WRONG     4
   0          1        WRONG     4
   1          0        WRONG     4
   0          1        WRONG     4
   1          1        RIGHT     5

I GUESSED LESS THAN 1/3 OF YOUR
     NUMBERS.

YOU BEAT ME. CONGRATULATIONS*****

DO YOU WANT TO TRY AGAIN (1 FOR YES,
     0 FOR NO)? 0

THANKS FOR THE GAME.
```

```
300 READ A, B, C
370 DATA 0, 1, 3
380 DIM M(26, 2), K(2, 2), L(8, 2)
400 FOR I=0 TO 26: FOR J=0 TO 2: M(I, J)=1:
    NEXT J: NEXT I
410 FOR I=0 TO 2:  FOR J=0 TO 2: K(I,J)=9:
    NEXT J:  NEXT I
420 FOR I=0 TO 8:  FOR J=0 TO 2: L(I,J)=3:
    NEXT J:  NEXT I
450 L(0, 0)=2: L(4, 1)=2: L(8, 2)=2
480  =26: Z1=8: Z2=2
510 X=0
520 FOR T=1 TO 3
530 PRINT
540 PRINT "TEN NUMBERS, PLEASE";
550 INPUT N(1), N(2), N(3), N(4), N(5), N(6),
    N(7), N(8), N(9), N(10)
560 FOR I=1 TO 10
570 W=N(I)-1
580 IF W=SGN(W) THEN 620
590 PRINT "ONLY USE THE DIGITS '0', '1', OR
    '2'."
600 PRINT "LET'S TRY AGAIN.": GOTO 530
620 NEXT I
630 PRINT: PRINT "MY GUESS","YOUR NO.",
    "RESULT", "NO. RIGHT": PRINT
660 FOR U=1 TO 10
```

```
670 N=N(U): S=0
690 FOR J=0 TO 2
700 S1=A*K(Z2, J)+B*L(Z1, J)+C*M(Z, J)
710 IF S>S1 THEN 760
720 IF S<S1 THEN 740
730 IF RND(0)<.5 THEN 760
740 S=S1: G=J
760 NEXT J
770 PRINT G, N(U),
780 IF G=N(U) THEN 810
790 PRINT "WRONG", X
800 GOTO 880
810 X=X+1
820 PRINT "RIGHT", X
830 M(Z, N)=M(Z, N)+1
840 L(Z1, N)=L(Z1, N)+1
850 K(Z2, N)=K(Z2, N)+1
860 Z=Z-INT(Z/9)*9
870 Z=3*Z+N(U)
880 Z1=Z-INT(Z/9)*9
890 Z2=N(U)
900 NEXT U
910 NEXT T
920 PRINT
930 IF X>10 THEN 980
940 IF X<10 THEN 1010
950 PRINT "I GUESSED EXACTLY 1/3 ON YOUR
```

```
      NUMBERS."
 960 PRINT "IT IS A TIE GAME."
 970 GOTO 1030
 980 PRINT "I GUESSED MORE THAN 1/3 OF
      YOUR NUMBERS."
 990 PRINT "I WIN."
1000 GOTO 1030
1010 PRINT "I GUESSED LESS THAN 1/3 OF YOUR
        NUMBERS."
1020 PRINT "YOU BEAT ME.
        CONGRATULATIONS·····"
1030 PRINT
1040 PRINT "DO YOU WANT TO TRY AGAIN (1
      FOR YES, 0 FOR NO)";
1060 INPUT X
1070 IF X=1 THEN 400
1080 PRINT: PRINT "THANKS FOR THE GANE."
1090 END
```

30. 智击潜艇

现在你是一名驱逐舰的舰长，发现了一艘敌方潜水艇，并受命去击沉它。假设已知敌潜艇在一定的范围内，计算机显示出“DIMENSION OF SEARCH AREA？”，要求指定搜索

区域。你打入一个数，例如 50，表示潜艇在你以东 50 米、北 50 米、深 50 米的立方体范围内。随后计算机告诉你可以打几发深水炸弹（搜索区域大，给定的炸弹就多。炸弹数 N是由 $\ln G/\ln 2+1$ 计算出来的，G 是上述立方体的边长，现为 50，则 $N=\frac{\ln 50}{\ln 2}+1=6.64$，给 6 发炸弹。如果 $G=10$，则 $N=\frac{\ln 10}{\ln 2}+1=4.32$，给 4 发炸弹）。每打一发炸弹，要向计算机打入三个数，分别表示东、北和深度。例如打入 25，25，25，是表示欲射击的目标定为离驱逐舰以东 25 米，以北 25 米，深 25 米。如打中，计算机显示出“BOOM”（击中），并告诉你是几次击中的。例如“YOW FOUND IT IN 3 TRIES”（你是第三次击中的），如未击中，计算机将向你指出射击偏差，例如“SONAR REPORTS SHOT WAS SOUTHEAST AND TOO LOW”（声纳报告炸弹落在潜艇东南方、太深）。你可以根据报告调整射击参数。如果你打完所有的炸弹而未能击沉潜艇，计算机则将指出：“YOU HAVE BEEN TORPEDOED ABANDON SHIP”（你已被鱼雷击中，速弃舰），并告诉你潜艇在什么地方。

最后计算机将问你：“要不要再玩一次”？如果你想再玩，可以打入“Y”（表示 YES），否则打入“N”（表示 NO.）

游戏的一次记录为

DIMENSION OF SEARCH AREA? 50

YOU ARE THE CAPTAIN OF THE DESTROYER
    COMPUTER

AN ENEMY SUB HAS BEEN CAUSING YOU
    TROUBLE. YOUR

MISSION IS TO DESTROY IT. YOU HAVE
6 SHOTS.
SPECIFY DEPTH CHARGE EXPLOSION POINT
WITH A
TRIO OF NUMBERS — THE FIRST TWO ARE
THE
SURFACE COORDINATES; THE THIRD IS THE
DEPTH.

GOOD LUCK!

TRIAL # 1 ? 25, 25, 25
SONAR REPORTS SHOT WAS SOUTHEAST
AND TOO LOW.

TRIAL # 2? 12, 35, 12
SONAR REPORTS SHOT WAS SOUTHWEST
AND TOO LOW.

TRIAL # 3? 18, 43, 5
SONAR REPORTS SHOT WAS NORTHEAST
AND TOO HIGH.

TRIAL # 4? 15, 39, 8
SONAR REPORTS SHOT WAS EAST AND
TOO LOW.

TRIAL # 5? 14, 39, 6

B O O M! ! YOU FOUND IT IN 5 TRIES!

ANOTHER GAME (Y OR N)? N

OK. HOPE YOU ENJOYED YOURSELF.

程序为:

```
20  INPUT "DIMENSION OF SEARCH AREA";
      G: PRINT
30  N = INT(LOG(G)/LOG(2)) + 1
40  PRINT "YOU ARE THE CAPTAIN CF THE
      DESTROYER COMPUTER"
50  PRINT "AN ENEMY SUB HAS BEEN CAUSING
    YOU TROUBLE. YOUR"
60  PRINT "MISSION IS TO DESTROY IT. YOU
    HAVE"; N; SHOTS."
70  PRINT "SPECIFY DEPTH CHARGE
    EXPLOSION POINT WITH A"
80  PRINT "TRIO OF NUMBERS — THE FIRST
    TWO ARE THE"
90  PRINT "SURFACE COORDINATES; THE
    THIRD IS THE DEPTH."
100 PRINT : PRINT "GOOD LUCK ! "
110 A = INT(G*RND(0)) : B = INT(G*RND(0)):
    C = INT(G*RND(0))
120 FOR D = 1 TO N : PRINT : PRINT "TRIAL
    #"; D; : INPUT X, Y, Z
130 IF ABS(X - A) + ABS(Y - B) + ABS(Z - C) = 0
    THEN 300
140 GOSUB 500 : PRINT : NEXT D
```

```
200 PRINT: PRINT "YOU HAVE BEEN
    TORPEDOED!  ABANDON SHIP! "
210 PRINT "THE SUBMARINE WAS AT"; A;
      ", "; B; ", "; C : GOTO 400
300 PRINT : PRINT "B O O M! !  YOU FOUND
      IT IN"; D; "TRIES! "
400 PRINT : PRINT: INPUT "ANOTHER GAME
      (Y OR N)"; A$
410 IF A$="Y" THEN 100
420 PRINT "OK. HOPE YOU ENJOYED
      YOURSELF." : GOTO 600
500 PRINT "SONAR REPORTS SHOT WAS ";
510 IF Y>B THEN PRINT "NORTH";
520 IF Y<B THEN PRINT "SOUTH";
530 IF X>A THEN PRINT "EAST";
540 IF X<A THEN PRINT "WEST";
550 IF Y< >B OR X< >A THEN PRINT " AND";
560 IF Z>C THEN PRINT " TOO LOW."
570 IF Z<C THEN PRINT " TOO HIGH."
580 IF Z=C THEN PRINT " DEPTH OK."
590 RETURN
600 END
```

31. 猜色棒比赛

有不同颜色的木棒（颜色可分别为黑、白、红、绿、橙、

黄、紫、褐，最多八种颜色，但可以少于八种）。由你指定木棒数和最多由几种颜色组成，计算机随机地将它们从左向右排列好。譬如，如果有四根棒，颜色不超过四种，则共有 $4^4=256$ 种排列的方案。如：

绿—红—白—黑
红—红—白—绿
红—白—红—绿
⋮

计算机选定一种排列以后让你猜，请按顺序打入四个颜色。颜色以字母来代表：

黑	B	(Black)
白	W	(White)
红	R	(Red)
绿	G	(Green)
橙	O	(Orange)
黄	Y	(Yellow)
紫	P	(Purple)
褐	T	(Tan)

如果你猜的位置和颜色都对，则给你一个“黑子”，如猜的颜色对而位置不对，则给你一个“白子”。譬如：计算机选的是：红—白—红—绿，而你猜的是：白—白—红—红。第二、三两个位置猜对了，得二黑子，第四个位置猜的是“红”，不对，但计算机选的方案中第一位置是“红”，即颜色对而位置不对，得一白子。一次次猜，直到猜中为止。同时计算机统计出你共猜了几次才猜中。以后你心中想好一种方案，让计算

机猜。在它打印出“HIT RETNRN WHEN READY？”时，按“回车”键。计算机猜四个色，问你可得黑子、白子多少？你应如实回答（如：0，1 表示零个黑子，一个白子）。随后计算机再猜…，直到猜对为止。此时打印出计算机猜几次才猜对，并统计出它和你的比分。

第一次游戏记录

```
NUMBER OF COLORS？4（颜色数）
NUMBER OF POSITIONS？4（木棒数）
NUMBER OF ROUNDS？1（游戏局数）
TOTAL POSSIBILITIES＝256（可能的方案）

COLOR          LETTER
=====          ======

BLACK          B
WHITE          W
RED            R
GREEN          G

ROUND NUMBER 1----

GUESS MY COMBINATION.
MOVE #   1 GUESS? BWWG
YOU HAVE 2 BLACKS AND 0 WHITES.
MOVE #   2 GUESS ? WWRR
YOU HAVE 2 BLACKS AND 1 WHITES.
MOVE #   3 GUESS ? WWRG
YOU HAVE 3 BLACKS AND 0 WHITES.
MOVE #   4 GUESS ? WWBR
YOU HAVE 1 BLACKS AND 1 WHITES.
```

```
MOVE #   5 GUESS ?  RWRG
YOU GUESSED IT IN 5 MOVES!
SCORE:
        COMPUTER 0
        HUMAN    5
NOW I GUESS. THINK OF A COMBINATION.
HIT RETURN WHEN READY ?
MY GUESS IS: RRGR BLACKS, WHITES ? 0,1
MY GUESS IS: GBBB BLACKS, WHITES ? 3,0
MY GUESS IS: GWBB BLACKS, WHITES ? 3,0
MY GUESS IS: GGBB BLACKS, WHITES ? 4,0
I GOT IT IN 4 MOVES!
SCORE:
        COMPUTER 4
        HUMAN    5
GAME OVER.
FINAL SCORE:
        COMPUTER 4
        HUMAN    5
```

第二次游戏记录：

```
NUMBER OF COLORS? 5
NUMBER OF POSITIONS? 4
NUMBER OF ROUNDS? 1
TOTAL POSSIBILITES = 625
```

```
COLOR          LETTER
=====          ======
BLACK            B
WHITE            W
RED              R
GREEN            G
ORANGE           O
ROUND NUMBER 1 ----
GUESS MY COMBINATION.
MOVE # 1 GUESS? BWBW
YOU HAVE 1 BLACKS AND 2 WHITES
MOVE # 2 GUESS? BBWO
YOU HAVE 3 BLACKS AND 0 WHITES
MOVE # 3 GUESS? BBWG
YOU HAVE 3 BLACKS AND 0 WHITES.
MOVE # 4 GUESS? BBWR
YOU HAVE 3 BLACKS AND 0 WHITES.
MOVE # 5 GUESS? BBWB
YOU GUESSED IT IN 5 MOVES!
SCORE:
        COMPUTER 0
        HUMAN    5
NOW I GUESS. THINK OF A COMBINATION.
HIT RETURN WHEN READY?
MY GUESS IS: BRRO BLACKS, WHITES? 1,1
MY GUESS IS: RRWG BLACKS, WHITES? 1,1
MY GUESS IS: GBRG BLACKS, WHITES? 0,2
```

```
MY GUESS IS: ROGO BLACKS, WHITES? 4,0
I GOT IT IN 4 MOVES!
SCORE:
          COMPUTER 4
          HUMAN    5
GAME OVER
FINAL SCORE:
          COMPUTER 4
          HUMAN    5
```

程序如下：

```
10  INPUT "NUMBER OF COLORS"; C9
20  IF C9>8 THEN PRINT "NO MORE THAN 8,
    PLEASE! ":GOTO 10
100 INPUT "NUMBER OF POSITIONS"; P9
110 INPUT "NUMBER OF ROUNDS"; R9
120 P=C9↑P9
130 PRINT "TOTAL POSSIBILITIES="; P
140 H=0: C=0
150 DIM Q(P9), S(10, 2), S$(10), A$(P9),
    G$(P9), I(P), H$(P9)
160 L$="BWRGOYPT"
170 PRINT
190 PRINT "COLOR        LETTER"
200 PRINT "=====        ======"
210 FOR X=1 TO C9
220 READ X$
230 PRINT X$; TAB(13); MID$(L$, X, 1)
240 NEXT X
```

```
250 PRINT
260 FOR R=1 TO R9
270 PRINT
280 PRINT "ROUND NUMBER "; R; "----"
290 PRINT
300 PRINT "GUESS MY COMBINATION."
310 REM      GET A COMBINATION
320 A=INT(P*RND(0)+1)
330 GOSUB 3000
340 FOR X=1 TO A
350 GOSUB 3500
360 NEXT X
370 FOR  M=1 TO 10
380 PRINT "MOVE # "; M; " GUESS "; : INPUT
    X$
390 IF X$="BOARD" THEN 2000
400 IF X$="QUIT" THEN 2500
410 IF LEN(X$)< >P9 THEN PRINT "BAD
    NUMBER OF POSITIONS.": GOTO 380
420 REM      UNPACK X$ INTO G$(1-P9)
430 FOR X=1 TO P9
440 FOR Y=1 TO C9
450 IF MID$(X$, X, 1)=MID$(L$, Y, 1) THEN
    480
460 NEXT Y
470 PRINT "'"; MID$(X$, X, 1); "' IS
    UNRECOGNIZED.": GOTO 380
```

```
480 G$(X)=MID$(X$, X, 1)
490 NEXT X
500 REM        NOW WE CONVERT Q(1-P9)
    INTO A$(1-P9) [ACTUAL GUESS]
510 GOSUB 4000
520 REM        AND GET NUMBER OF BLACKS
    AND WHITES
530 GOSUB 4500
540 IF B=P9 THEN 630
550 REM        TELL HUMAN RESULTS
560 PRINT "YOU HAVE "; B; " BLACKS AND
    "; W; " WHITES."
570 REM       SAVE ALL THIS STUFF FOR
    BOARD PRINTOUT LATER
580 S$(M)=X$
590 S(M, 1)=B
600 S(M, 2)=W
610 NEXT M
620 PRINT "YOU RAN OUT OF MOVES! THAT'S
    ALL YOU GET! ": GOTO 640
622 GOSUB 4000
623 PRINT "THE ACTUAL COMBINATION
    WAS:";
624 FOR X=1 TO P9
625 PRINT A$(X);
626 NEXT X
627 PRINT
630 PRINT "YOU GUESSED IT IN "; M;
```

```
    "MOVES! "
640 H=H+M
650 GOSUB 5000
660 REM.
670 REM      NOW COMPUTER GUESSES
680 REM
690 FOR X=1 TO P
700 I(X)=1
713 NEXT X
720 PRINT "NOW I GUESS. THINK OF A
    COMBINATION."
730 INPUT "HIT RETURN WHEN READY "; X$
740 FOR M=1 TO 10
750 GOSUB 3000
760 REM      FIND A GUESS
770 G=INT(P*RND(0)+1)
780 IF I(G)=1 THEN 890
790 FOR X=G TO P
800 IF I(X)=1 THEN 880
810 NEXT X
820 FOR X=1 TO G
830 IF I(X)=1 THEN 880
840 NEXT X
850 PRINT "YOU DUMMY, YOU HAVE GIVEN
    ME INCONSISTENT INFORMATION."
860 PRINT "LET'S TRY AGAIN,AND THIS
    TIME, BE MORE CAREFUL."
```

```
870 GOTO 660
880 G=X
890 REM      NOW WE CONVERT GUESS #G
    INTO G$
900 FOR X=1 TO G
910 GOSUB 3500
920 NEXT X
930 GOSUB 6000
940 PRINT "MY GUESS IS: ";
950 FOR X=1 TO P9
960 PRINT H$(X);
970 NEXT X
980 INPUT " BLACKS, WHITES "; B1, W1
990 IF B1=P9 THEN 1120
1000 GOSUB 3000
1010 FOR X=1 TO P
1020 GOSUB 3500
1030 IF I(X)=0 THEN 1070
1035 GOSUB 6500
1040 GOSUB 4000
1050 GOSUB 4500
1060 IF B1< >B OR W1< >W THEN I(X)=0
1070 NEXT X
1080 NEXT M
1090 PRINT " I USED UP ALL MY MOVES! "
1100 PRINT "I GUESS MY CPU IS JUST HAVING
     AN OFF DAY."
1110 GOTO 1130
```

```
1120 PRINT "I GOT IT IN "; M; "MOVES! "
1130 C=C+M
1140 GOSUB 5000
1150 NEXT R
1160 PRINT "GAME OVER"
1170 PRINT "FINAL SCORE: "
1180 GOSUB 5040
1190 STOP
2010 REM       BOARD PRINTOUT ROUTINE
2025 PRINT
2030 PRINT "BOARD"
2040 PRINT "MOVE";TAB(9);" GUESS ";TAB(25);
     "BLACK ";TAB(35);" WHITE"
2050 FOR Z=1 TO M-1
2060 PRINT Z; TAB(9); S$(Z); TAB(25); S(Z,1);
     TAB(35); S(Z,2)
2070 NEXT Z
2075 PRINT
2080 GOTO 380
2500 REM
2510 REM       QUIT ROUTINE
2530 PRINT "QUITTER! MY COMBINATION WAS:
     ";
2535 GOSUB 4000
2540 FOR X=1 TO P9
2550 PRINT A$(X);
2560 NEXT X
```

```
2565 PRINT
2570 PRINT "GOOD BYE"
2580 STOP
3010 REM       INITIALIZE Q(1-P9) TO ZEROS
3030 FOR S=1 TO P9
3040 Q(S)=0
3050 NEXT S
3060 RETURN
3510 REM       INCREMENT Q(1—P9)
3522 IF Q(1)>0 THEN 3530
3524 REM IF ZERO, THIS IS OUR FIRST
     INCREMENT: MAKE ALL ONES
3526 FOR S=1 TO P9
3527 Q(S)=1
3528 NEXT S
3529 RETURN
3530 Q=1
3540 Q(Q)=Q(Q)+1
3550 IF Q(Q)<=C9 THEN RETURN
3560 Q(Q)=1
3570 Q=Q+1
3580 GOTO 3540
4010 REM       CONVERT Q(1-P9) TO A$(1-P9)
```

```
4030 FOR S=1 TO P9
4040 A$(S)=MID$(L$, Q(S), 1)
4050 NEXT S
4060 RETURN
4510 REM        GET NUMBER OF BLACKS (B)
     AND WHITES (W)
4520 REM        MASHES G$ AND A$ IN THE
     PROCESS
4540 B=0: W=0: F=0
4550 FOR S=1 TO P9
4560 IF G$(S)< >A$(S) THEN 4620
4570 B=B+1
4580 G$(S)=CHR$(F)
4590 A$(S)=CHR$(F+1)
4600 F=F+2
4610 GOTO 4660
4620 FOR T=1 TO P9
4630 IF G$(S)< >A$(T) THEN 4650
4640 IF G$(T)=A$(T) THEN 4650
4645 W=W+1: A$(T)=CHR$(F): G$(S)=CHR$
     (F+1): F=F+2: GOTO 4660
4650 NEXT T
4660 NEXT S
4670 RETURN
```

```
5010 REM        PRINT SCORE
5030 PRINT "SCORE: "
5040 PRINT "       COMPUTER "; C
5050 PRINT "       HUMAN      "; H
5060 PRINT
5070 RETURN
5510 REM     CONVERT Q(1-P9) INTO G$(1-P9)
5530 FOR S=1 TO P9
5540 G$(S)=MID$(L$, Q(S), 1)
5550 NEXT S
5560 RETURN
6010 REM        CONVERT Q(1-P9) TO H$(1-P9)
6030 FOR S=1 TO P9
6040 H$(S)=MID$(L$, Q(S), 1)
6050 NEXT S
6060 RETURN
6510 REM        COPY H$ INTO G$
6530 FOR S=1 TO P9
6540 G$(S)=H$(S)
6550 NEXT S
6560 RETURN
8000 REM        PROGRAM DATA FOR COLOR
     NAMES
8010 DATA"BLACK","WHITE","RED",
     "ORANGE", "YELLOW","PURPLE","TAN"
9998 REM ...WE'RE SORRY BUT IT'S TIME TO
     GO...
```

9999 END

32. 会“学习”的计算机

你心中先想好一种动物，让计算机来猜它是什么。计算机开始只知道两种动物：鸟（BIRD）和鱼（FISH）。计算机先向你提出问题，并根据你的回答判断究竟是鸟还是鱼。如果都不对，计算机要求你告诉它你心中的这一动物叫什么名字。如回答它是象（ELEPHANT）。计算机要求你说明象和它刚才猜的动物（鸟）之间的某一方面差别，这是由你用提问并回答的形式提供的。例如你打入“DOES IT LIKE PEANUTS”（它喜欢落花生吗？），并由你回答“是”或“否”（YES 或 NO）。计算机由此“增长”了知识，知道有一种动物名叫“象”，喜欢落花生，然后计算机再让你想另一种动物。假如你心目中这种动物是“海豹”，计算机根据它已有的知识问你“它会游泳吗？”你回答“会”，计算机从它已有的“动物字典”中查出鱼会游泳，问你是不是鱼？你回答“不是”。计算机又要求你说出你心目中这一动物是什么？你回答“海豹”。计算机要求你描述海豹与鱼之间的区别。你可打入“DOES IT HAVE SCALES”（它有鳞吗），然后回答“没有”，计算机又把这一特征记下来。如此一次一次地“训练”，使计算机“知道”愈来愈多的动物，以后便能根据这些动物的名字和特点来进行猜测，也就是说计算机会“学习”新的知识。

当计算机打出“ARE YOU THINKING OF AN

ANIMAL？”时，如果你打入“LIST”（而不是“YES”或“Y”），计算机就打印出它“学习”到的全部动物的名字。

改变 530 语句就可以改变原有的“知识库”。例如可以不猜动物，改成猜机器的名字（告诉它不同机器的特点）、猜食物（告诉你不同食物的特性）等。这种游戏是颇为有趣的。

PLAY 'GUESS THE ANIMAL'

THINK OF AN ANIMAL AND THE COMPUTER WILL TRY TO GUESS IT.

ARE YOU THINKING OF AN ANIMAL? Y （你想一个动物）

DOES IT SWIM? NO

IS IT A BIRD? NO

THE ANIMAL YOU WERE THINKING OF WAS A? ELEPHANT （象）

PLEASE TYPE IN A QUESTION THAT WOULD DISTINGUISH A

ELEPHANT FROM A BIRD

? DOES IT LIKE PEANUTS

FOR A ELEPHANT THE ANSWER WOULD BE? YES

ARE YOU THINKING OF AN ANIMAL? YES（你再想一个动物）

```
DOES IT SWIM? YES
IS IT A FISH? NO
THE ANIMAL YOU WERE THINKING OF WAS
    A? SEAL
PLEASE TYPE IN A QUESTION THAT WOULD
    DISTINGUISH A
SEAL FROM A FISH
? DOES IT HAVE SCALES    （它有鳞吗？）
FOR A SEAL THE ANSWER WOULD BE? NO
ARE YOU THINKING OF AN ANIMAL? YES
DOES IT SWIM? NO
DOES IT LIKE PEANUTS? NO
IS IT A BIRD? NO
THE ANIMAL YOU WERE THINKING OF WAS
    A? LION
PLEASE TYPE IN A QUESTION THAT WOULD
    DISTINGUISH A
LION FROM A BIRD
? DOES IT ROAR
FOR A LION THE ANSWER WOULD BE? YES
ARE YOU THINKING OF AN ANIMAL? YES
DOES IT SWIM? YES
DOES IT HAVE SCALES? NO
IS IT A SEAL? NO
THE ANIMAL YOU WERE THINKING OF WAS
```

```
   A? OCTOPUS
PLEASE TYPE A QUESTION THAT WOULD
   DISTINGUISH A
OCTOPUS FROM A SEAL
? DOES IT HAVE EIGHT TENTACLES
FOR A OCTOPUS THE ANSWER WOULD BE ?
   YES

ARE YOU THINKING OF AN ANIMAL? YES
DOES IT SWIM? NO
DOES IT LIKE PEANUTS? YES
IS IT A ELEPHANT? YES
WHY NOT TRY ANOTHER ANIMAL?
ARE YOU THINKING OF AN ANIMAL? YES
DOES IT SWIM? NO
DOES IT LIKE PEANUTS? NO
DOES IT ROAR? NO
IS IT A BIRD? NO
THE ANIMAL YOU WERE THINKING OF WAS
   A ? WUMPUS
PLEASE TYPE IN A QUESTION THAT WOULD
   DISTINGUISH A

WUMPUS FROM A BIRD
? IS ITS LAST NAME YOB
FOR A WUMPUS THE ANSWER WOULD BE ?
   YES

ARE YOU THINKING OF AN ANIMAL? LIST
```

```
ANIMALS I ALREADY KNOW ARE:
ELEPHANT FISH LION SEAL OCTOPUS
BIRD WUMPUS
ARE YOU THINKING OF AN ANIMAL? NO
```

程序为：

```
10  PRINT "PLAY 'GUESS THE ANIMAL'"
50  PRINT "THINK OF AN ANIMAL AND THE
    COMPUTER WILL TRY TO GUESS IT."
60  PRINT
70  BIM A$(200)
80  FOR I=0 TO 3
90  READ A$(I)
100 NEXT I
110 N=VAL(A$(0))
120 REM         MAIN CONTROL SECTION
130 INPUT "ARE YOU THINKING OF AN
    ANIMAL"; A$
140 IF A$="LIST" THEM 600
150 IF LEFT$(A$, 1)< >"Y" THEN 130
160 K=1
170 GOSUB 390
180 IF LEN(A$(K))=0 THEN 999
190 IF LEFT$(A$(K), 2)="\Q" THEN 170
200 PRINT "IS IT A ";RIGHT$(A$(K),LEN(A$
    (K))-2);
```

```
210 INPUT A$
220 A$=LEFT$(A$, 1)
230.IF A$="Y" THEN PRINT "WHY NOT TRY
    ANOTHER ANIMAL? ": GOTO 130
240 INPUT "THE ANIMAL YOU WERE THINKING
    OF WAS A "; V$
250 PRINT "PLEASE TYPE IN A QUESTION
    THAT WOULD DISTINGUISH A"
260 PRINT V$; " FROM A "; RIGHT$(A$(K),
    LEN(A$(K))-2)
270 INPUT X$
280 PRINT "FOR A "; V$;" THE ANSWER
    WOULD BE ";
290 INPUT A$
300 A$=LEFT$(A$, 1): IF A$<>"Y" AND
    A$< >"N" THEN 280
310 IF A$="Y" THEN B$="N"
320 IF A$="N" THEN B$="Y"
330 Z1=VAL(A$(0))
340 A$(0)=STR$(Z1+2)
350 A$(Z1)=A$(K)
360 A$(Z1+1)="\A"+V$
370 A$(K)="\Q"+X$+"\"+A$+STR$(Z1+1)+
    "\"+B$+STR$(Z1)+"\"
380 GOTO 130
390 REN        SUBROUTINE TO PRINT
    QUESTIONS
```

```
400 Q$ = A$(K)
410 FOR Z = 3 TO LEN(Q$)
415 IF MID$(Q$, Z, 1)< >"\" THEN PRINT
    MID$(Q$, Z, 1);: NEXT Z
420 INPUT C$
430 C$ = LEFT$(C$, 1)
440 IF C$< >"Y" AND C$< >"N" THEN 410
450 T$ = "\" + C$
455 FOR X = 3 TO LEN(Q$) - 1
460 IF MID$(Q$,X,2) = T$ THEN 480
470 NEXT X
475 STOP
480 FOR Y = X + 1 TO LEN(Q$)
490 IF MID$(Q$,Y,1) = "\" THEN 510
500 NEXT Y
505 STOP
510 K = VAL(MID$(Q$,X + 2,Y - X—2))
520 RETURN
530 DATA "4", "\QDOES IT SWIM\Y2\N3\",
    "\AFISH","\ABIRD"
600 PRINT: PRINT "ANIMALS I ALREADY
    KNOW ARE: "
605 X = 0
610 FOR I = 1 TO 200
620 IF LEFT$(A$(I),2)< >"\A" THEN 650
624 PRINT TAB(12 * X);
630 FOR Z = 3 TO LEN(A$(I))
```

```
640 IF MID$(A$(I),Z,1)<>"\" THEN PRINT
    MID$(A$(I),Z,1);: NEXT Z
645 X=X+1: IF X>5 THEN X=0: PRINT
650 NEXT I
660 PRINT
670 PRINT
680 GOTO 130
999 END
```

33. 取　　数

假设有数 N，你和计算机轮流从中取走一个数 X(事先规定每次取走的数 X 不能超过某一指定的常数 K)。如果你取完一个数后，余下的数为 1，则你胜。如果计算机取完一个数后，余下的数为 1，而迫使你取 1，则计算机胜利。

游戏的记录如下：

TYPE THE INITIAL NUMBER YOU CHOOSE (你指定开始的数是多少)

? 100　　　　　　　(指定为 100)

TYPE THE MAXIMUM NUMBER WHICH CAN BE TAKEN AWAY

? 40　　　　　(指定每次可以取走的最大值)

YOUR MOVE IS ? 15

MY MOVE IS 2

NUMBER REMAINING IS 83

YOUR MOVE IS? 35

MY MOVE IS 6

```
NUMBER REMAINING IS 42
YOUR MOVE IS ? 23
MY MOVE IS 18
NUMBER REMAINING IS 1
YOUR MOVE IS ? 1

**** I WIN ****
IF Y=1 TO PLAY AGAIN, IF Y=0
   OTHERWISE? 0 (不再玩了)
```

程序为：

```
100 PRINT "TYPE THE INITIAL NUMBER
      YOU CHOOSE"
140 INPUT N
160 PRINT "TYPE THE MAXIMUM NUMBER
    WHICH CAN BE TAKEN AWAY"
170 INPUT K
175 IF K>N THEN 160
180 PRINT "YOUR MOVE IS";
190 INPUT X
200 IF X<1 THEN 270
210 IF X>K THEN 270
230 REM TEST FOR WIN
240 N=N-X
250 IF N>0 THEN 290
255 PRINT
260 PRINT " ", "**** I WIN ****"
```

```
265 GOTO 440
270 PRINT " ILLEGAL MOVE"
280 GOTO 180
290 REM COMPUTE MOVE
300 Q=INT((N-1)/(K+1))
310 Y=(N-1)-Q*(K+1)
315 IF Y <> 0 THEN 330
320 Y=1
330 N=N-Y
340 PRINT "MY MOVE IS "; Y
370 IF N=0 THEN 430
380 PRINT "NUMBER REMAINING IS"; N
390 GOTO 180
400 PRINT
4 0 REM IMPLEMENT LATER
430 PRINT "----BEGINNER IS LUCK YOU BEAT
    ME ----"
440 PRINT "IF Y=1 TO PLAY AGAIN, IF Y=0
    OTHERWISE";
450 INPUT Y
460 PRINT
470 IF Y=1 THEN 100
480 END
```

34. 23 根 火 柴

桌子上放着 23根火柴。有两个人轮流取火柴，每次只能取

一根、二根或三根，取最后一根的人为输。由计算机代表一方。先由计算机模拟抽签决定由谁先取，随后开始取火柴，每次取后，计算机打印出余下的火柴数。如果轮到你最后一次取时，火柴数为 4、3 或 2，那么你就会赢，因为你可以取 3、2 或1，最后余下一根给对方。你应当给对手留下的火柴数为5，它就会输。

```
I TAKE 2 MATCHES
THE NUMBER OF MATCHES IS NOW 21

YOUR TURN — YOU MAY TAKE 1, 2, OR 3
   MATCHES.
HOW MANY DO YOU WISH TO REMOVE ?3
THERE ARE NOW 18 MATCHES REMAINING.
MY TURN ! I REMOVE 1 MATCHES
THE NUMBER OF MATCHES IS NOW 17

YOUR TURN — YOU MAY TAKE 1,2,OR 3
   MATCHES.
HOW MANY DO YOU WISH TO REMOVE ?1
THERE ARE NOW 16 MATCHES REMAINING.
MY TURN ! I REMOVE 3 MATCHES
TNE NUMBER OF MATCHES IS NOW 13

YOUR TURN — YOU MAY TAKE 1,2,OR 3
   MATCHES.
HOW MANY DO YOU WISH TO REMOVE ?1
THERE ARE NOW 12 MATCHES REMAINING.
MY TURN ! I REMOVE 3 MATCHES
```

```
TNE NUMBER OF MATCHES IS NOW 9
YOUR TURN — YOU MAY TAKE 1,2,OR 3
    MATCHES.
HOW MANY DO YOU WISH TO REMOVE ?1
THERE ARE NOW 8 MATCHES REMAINING.
MY TURN ! I REMOVE 3 MATCHES
THE NUMBER OF MATCHES IS NOW 5
YOUR TURN — YOU MAY TAKE 1,2,OR 3
    MATCHES.
HOW MANY DO YOU WISH TO REMOVE ?2
THERE ARE NOW 3 MATCHES REMAINING.
MY TURN ! I REMOVE 2 MATCHES
YOU POOR BOOB ! YOU TOOK THE LAST
    MATCH ! I GOTCHA ! !
HA ! HA! I BEAT YOU ! ! !
GOOD BYE LOSER!
```

```
100 N=23
170 Q=INT(2*RND(0))
180 IF Q=1 THEN 230 (计算机先取)
200 GOTO 300            (你先取)
230 PRINT
250 PRINT " I TAKE 2 MATCHES"
260 N=N-2
270 PRINT "THE NUMBER OF MATCHES IS
    NOW"; N
```

```
280 PRINT
290 PRINT "YOUR TURN — YOU MAY TAKE 1,
    2,OR 3 MATCHES."
300 PRINT "HOW MANY DO YOU WISH TO
    REMOVE";
310 INPUT K
320 IF K>3 THEN 310
330 IF K <=0 THEN 310
340 N=N-K
350 PRINT "THERE ARE NOW ";N;"MATCHES
    REMAINING."
351 IF N=4 THEN 381
352 IF N=3 THEN 383
353 IF N=2 THEN 385
360 IF N  <=1 THEN 530
370 Z=4-K
372 GOTO 390
380 PRINT
381 Z=3
382 GOTO 390
383 Z=2
384 GOTO 390
385 Z=1
390 PRINT "MY TURN ! I REMOVE"; Z;
    "MATCHES"
400 N=N-Z
410 IF N<=1 THEN 470
```

```
420 GOTO 270
470 PRINT
480 PRINT"YOU POOR BOOB ! YOU TOOK THE
    LAST MATCH ! I GOTCHA ! ! "
490 PRINT "HA ! HA! I BEAT YOU !!!"
500 PRINT
510 PRINT "GOOD BYE LOSER! "
520 GOTO 560
530 PRINT "YOU WON, FLOPPY EARS !"
560 END
```

35. 取物竞赛

假定桌上有一堆物品（譬如铜币），你和你的对手轮流从这堆中拿取。你可以事先指定每次取物的最大数值和最小数值，还可以指定以哪种结局为胜（指定“1”表示取最后一个物品的人为胜。指定“2”表示取最后一物品者为输），以及指定由你先取还是由计算机先取。

```
THE GAME STARTS WITH AN ASSUMED PILE
    OF OBJECTS.
YOU AND YOUR OPPONENT ALTERNATELY
    REMOVE OBJECTS FROM
THE PILE. WINNING IS DEFINED IN ADVANCE
    AS TAKING THE
LAST OBJECT OR NOT. YOU CAN ALSO
    SPECIFY SOME OTHER
BEGINNING CONDITIONS. DON'T USE ZERO,
```

```
    HOWEVER, IN
PLAYING THE GAME.
ENTER PILE SIZE? 23   (堆中物品件数)
ENTER WIN OPTION - 1 TO TAKE LAST,
  2 TO AVOID LAST: ? 2
ENTER MIN AND MAX ? 1,3 (最少取1, 最多
    取 3)
ENTER START OPTION - 1 COMPUTER
    FIRST, 2 YOU FIRST ? 2 (你先取)
YOUR MOVE ? 2
COMPUTER TAKES 1 AND LEAVES 20
YOUR MOVE ? 3
COMPUTER TAKES 1 AND LEAVES 16
YOUR MOVE ? 3
COMPUTER TAKES 1 AND LEAVES 12
YOUR MOVE ? 3
COMPUTER TAKES 1 AND LEAVES 8
YOUR MOVE ? 3
COMPUTER TAKES 1 AND LEAVES 4
YOUR MOVE ? 3
COMPUTER TAKES 1 AND LOSES.
```

程序如下:

```
140 PRINT "THE GAME STARTS WITH AN
   ASSUMED PILE OF OBJECTS."
150 PRINT "YOU AND YOUR OPPONENT
   ALTERNATELY REMOVE OBJECTS FROM"
160 PRINT "THE PILE. WINNING IS DEFINED IN
```

```
    ADVANCE AS TAKING THE"
170 PRINT "LAST OBJECT OR NOT. YOU CAN
    ALSO SPECIFY SOME OTHER"
180 PRINT "BEGINNING CONDITIONS. DON'T
    USE ZERO, HOWEVER, IN"
190 PRINT "PLAYING THE GAME."
200 PRINT
210 GOTO 330
220 FOR I=1 TO 10
230 PRINT
240 NEXT I
330 INPUT "ENTER PILE SIZE"; N
350 IF N< >0 THEN 370
360 GOTO 330
370 IF N< >INT(N) THEN 220
380 IF N<1 THEN 220
390 INPUT "ENTER WIN OPTION- 1 TO TAKE
    LAST, 2 TO AVOID LAST: "; M
410 IF M=1 THEN 430
420 IF M< >2 THEN 390
430 INPUT "ENTER MIN AND MAX "; A, B
450 IF A>B THEN 430
460 IF A<1 THEN 430
470 IF A< >INT(A) THEN 430
480 IF B< >INT(B) THEN 430
490 INPUT "ENTER START OPTION- 1
    COMPUTER FIRST, 2 YOU FIRST "; S
```

```
510 IF S=1 THEN 530
520 IF S<>2 THEN 490
530 C=A+B
540 IF S=2 THEN 570
550 GOSUB 600
560 IF W=1 THEN 220
570 GOSUB 810
580 IF W=1 THEN 220
590 GOTO 550
600 Q=N
610 IF M=1 THEN 630
620 Q=Q-1
630 IF M=1 THEN 680
640 IF N>A THEN 720
650 W=1
660 PRINT "COMPUTER TAKES"; N; "AND
    LOSES."
670 RETURN
680 IF N>B THEN 720
690 W=1
700 PRINT "COMPUTER TAKES";N;"AND WINS."
710 RETURN
720 P=Q-C*INT(Q/C)
730 IF P>=A THEN 750
740 P=A
750 IF P<=B THEN 770
760 P=B
```

```
770 N=N-P
780 PRINT "COMPUTER TAKES";P; "AND
    LEAVES"; N
790 W=0
800 RETURN
810 PRINT "YOUR MOVE ";
820 INPUT P
830 IF P< >0 THEN 870
840 PRINT "I TOLD YOU NOT TO USE ZERO!
    COMPUTER WINS BY FORFEIT."
850 W=1
860 RETURN
870 IF P< >INT(P) THEN 920
880 IF P>=A THEN 910
890 IF P=N THEN 960
900 GOTO 920
910 IF P<=B THEN 940
920 PRINT "ILLEGAL MOVE, REENTER IT ";
930 GOTO 820
940 N=N-P
950 IF N< >0 THEN 1030
960 IF M=1 THEN 1000
970 PRINT "TOUGH LUCK, YOU LOSE."
980 W=1
990 RETURN
1000 PRINT "CONGRATULATIONS, YOU WIN."
1010 W=1
```

```
1020 RETURN
1030 IF N>=0 THEN 1060
1040 N=N+P
1050 GOTO 920
1060 W=0
1070 RETURN
1080 END
```

36. 偶数者胜（一）

有一堆物品（例如弹子、筹码、火柴），它们的件数为奇数。你和计算机轮流取这些东西，每人每次取 1—4 个，当全部取完时游戏结束，谁取的总数为偶数则胜。

本程序设开始时物品为 27 件，你也可以通过改变 250 语句而修改此数字。

在本程序中，计算机是按照一个固定的规律来选数的，如果你技巧不高，估计不大可能战胜它。

```
THIS IS A TWO PERSON GAME CALLED 'EVEN
  WINS.'
TO PLAY THE GAME, THE PLAYERS NEED
27 MARBLES OR OTHER OBJECTS ON A
  TABLE.

  THE 2 PLAYERS ALTERNATE TURNS, WITH
EACH PLAYER REMOVING FROM 1 TO 4 MARBLES
ON EACH MOVE. THE GAME ENDS WHEN THERE
ARE NO MARBLES LEFT, AND THE WINNER IS
THE ONE WITH AN EVEN NUMBER OF MARBLES.
```

TYPE A 1 IF YOU WANT TO GO FIRST, AND TYPE A 0 IF YOU WANT ME TO GO FIRST.

```
? 0
TOTAL=27
I PICK UP 2 MARBLES.
TOTAL=25

    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
      IS 2
? 2
TOTAL=23
    YOUR TOTAL IS 2
I PICK UP 4 MARBLES.
TOTAL=19

    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
      IS 6
? 4

TOTAL=15
    YOUR TOTAL IS 6
I PICK UP 2 MARBLES.
TOTAL=13

    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
      IS 8
```

```
? 1
TOTAL = 12
    YOUR TOTAL IS 7
I PICK UP 1 MARBLES.
TOTAL = 11
    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
        IS 9
? 3
TOTAL = 8
    YOUR TOTAL IS 10
I PICK UP 1 MARBLES.
TOTAL = 7
    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
      IS 10
? 1
TOTAL = 6
    YOUR TOTAL IS 11
I PICK UP 1 MARBLES.
TOTAL = 5
    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
      IS 11
? 1
TOTAL = 4
```

```
    YOUR TOTAL IS 12
I PICK UP 3 MARBLES.
TOTAL=1
    AND WHAT IS YOUR NEXT MOVE, MY TOTAL
      IS 14
? 1
THAT IS ALL OF THE MARBLES.
MY TOTAL IS 14 YOUR TOTAL IS 13
    I WON. DO YOU WANT TO PLAY
AGAIN? TYPE 1 FOR YES AND 0 FOR NO.
```

程序为:

```
4   Y1=0
10  M1=0
20  DIM M(20), Y(20)
30  PRINT "     THIS IS A TWO PERSON GAME
    CALLED 'EVEN WINS.'"
40  PRINT "TO PLAY THE GAME. THE
    PLAYERS NEED"
50  PRINT "27 MARBLES  OR  OTHER OBJECTS
      ON A TABLE."
60  PRINT
70  PRINT
80  PRINT "     THE 2 PLAYERS ALTERNATE
```

```
    TURNS, WITH"
90  PRINT "EACH PLAYER REMOVING
      FROM 1 TO 4 MARBLES"
100 PRINT "ON EACH MOVE. THE GAME
      ENDS WHEN THERE"
105 PRINT "ARE NO MARBLES LEFT, AND
      THE WINNER IS"
110 PRINT  "THE ONE WITH AN EVEN NUMBER
    OF MARBLES."
120 PRINT
200 PRINT "     TYPE A 1 IF YOU WANT TO
    GO FIRST, AND"
210 PRINT "TYPE A 0 IF YOU WANT ME
    TO GO FIRST".
220 INPUT C
230 IF C=0 THEN 250
240 GOTO 1060
250 T=27
260 M=2
270 PRINT "TOTAL=", T
280 M1=M1+M
290 T=T-M
300 PRINT "I PICK UP"; M; "MARBLES."
310 IF T=0 THEN 880
320 PRINT "TOTAL="; T
330 PRINT
```

```
340 PRINT "     AND WHAT IS YOUR NEXT
    MOVE, MY TOTAL IS"; M1
350 INPUT Y
360 PRINT
370 IF Y<1 THEN 1160
380 IF Y>4 THEN 1160
390 IF Y<=T THEN 430
400 PRINT "     YOU HAVE TRIED TO TAKE
    MORE MARBLES THAN THERE ARE"
410 PRINT "LEFT. TRY AGAIN."
420 GOTO 350
430 Y1=Y1+Y
440 T=T-Y
450 IF T=0 THEN 880
460 PRINT "TOTAL="; T
470 PRINT
480 PRINT "  YOUR TOTAL IS"; Y1
490 IF T<.5 THEN 880
500 R=T-6*INT(T/6)
510 IF INT(Y1/2)=Y1/2 THEN 700
520 IF T<4.2 THEN 580
530 IF R>3.4 THEN 620
540 M=R+1
550 M1=M1+M
560 T=T-M
570 GOTO 300
580 M=T
```

```
590 T = T - M
600 GOTO 830
610 REM     250 IS WHERE I WIN.
620 IF R<4.7 THEN 660
630 IF R>3.5 THEN 660
640 M = 1
650 GOTO 670
660 M = 4
670 T = T - M
680 M1 = M1 + M
690 GOTO 300
700 REM       I AM READY TO ENCODE THE
    STRAT FOR WHEN OPP TOT IS EVEN
710 IF R<1.5 THEN 1020
720 IF R>5.3 THEN 1020
730 M = R - 1
740 M1 = M1 + M
750 T = T - M
760 IF T<.2 THEN 790
770 REM       IS # ZERO HERE
780 GOTO 300
790 REM       IS = ZERO HERE
800 PRINT "I PICK UP"; M; ""MARBLES."
810 PRINT
820 GOTO 880
830 REM       THIS IS WHERE I WIN
840 PRINT "I PICK UP"; M; "MARBLES."
```

```
850 PRINT
860 PRINT "TOTAL=0"
870 M1=M1+M
880 PRINT "THAT IS ALL OF THE MARBLES."
890 PRINT
900 PRINT "MY TOTAL IS"; M1;" YOUR TOTAL
    IS"; Y1
910 PRINT
920 IF INT(M1/2)=M1/2 THEN 950
930 PRINT "        YOU WON. DO YOU WANT TO
    PLAY"
940 GOTO 960
950 PRINT "         I WON. DO YOU WANT TO
    PLAY"
960 PRINT "AGAIN? TYPE 1 FOR YES AND 0
    FOR NO."
970 INPUT A1
980 IF A1=0 THEN 1030
990 M1=0
1000 Y1=0
1010 GOTO 200
1020 GOTO 640
1030 PRINT
1040 PRINT "OK. SEE YOU LATER."
1050 GOTO 1230
1060 T=27
1080 PRINT
```

```
1100 PRINT "TOTAL=", T
1120 PRINT
1130 PRINT "        WHAT IS YOUR FIRST MOVE"
1140 INPUT Y
1150 GOTO 360
1160 PRINT
1170 PRINT "THE NUMBER OF MARBLES YOU
     TAKE MUST BE A POSITIVE"
1180 PRINT "INTEGER BETWEEN 1 AND 4."
1190 PRINT
1200 PRINT "        WHAT IS YOUR NEXT MOVE"
1210 PRINT
1220 PRINT
1220 GOTO 350
1230 END
```

37. 偶数者胜（二）

由计算机产生一个随机数，它代表放在盘上的筹码的个数，是一个奇数。每次每人可以取 1—4 个，最后结束时，谁取的总数为偶数则胜。

计算机开始时只知道游戏的规则，但它会从实践中学习，玩过二十次之后，你就难以取胜计算机了。

如果你不想玩了，打入一个“0”即可。

```
THERE ARE 21 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS LEAVING 17
YOUR MOVE? 4
```

```
THERE ARE 13 CHIPS ON THE BOARD.
COMPUTER TAKES 4  CHIPS  LEAVING 9
YOUR MOVE? 2
THERE ARE 7 CHIPS ON THE BOARD.
COMPUTER TAKES 4  CHIPS  LEAVING  3
YOUR MOVE? 1
THERE ARE 2 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS.
GAME OVER ... I WIN! ! !

THERE ARE 19 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS LEAVING 15
YOUR MOVE? 4
THERE ARE 11 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS  LEAVING 7
YOUR MOVE? 2
THERE ARE 5 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS  LEAVING 1
YOUR MOVE? 1
GAME OVER ... I WIN! ! !

THERE ARE 9 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS  LEAVING 5
YOUR MOVE? 2
THERE ARE 3 CHIPS ON THE BOARD.
COMPUTER TAKES 3 CHIPS.
GAME OVER ... YOU WIN! ! !

THERE ARE 21 CHIPS ON THE BOARD.
```

```
COMPUTER TAKES 2 CHIPS LEAVING 19
YOUR MOVE? 2
THERE ARE 17 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS LEAVING 13
YOUR MOVE? 1
THERE ARE 12 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS  LEAVING 8
YOUR MOVE? 3
THERE ARE 5 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS  LEAVING 1
YOUR MOVE? 1
GAME OVER ... I WIN! ! !
THERE ARE 9 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS  LEAVING 7
YOUR MOVE? 4
THERE ARE 3 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS  LEAVING 1
YOUR MOVE? 1
GAME OVER ... I WIN! ! !
THERE ARE 21 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS  LEAVING 19
YOUR MOVE? 1
THERE ARE 18 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS  LEAVING 14
YOUR MOVE? 1
THERE ARE 13 CHIPS ON THE BOARD.
```

```
COMPUTER TAKES 4 CHIPS LEAVING 9
YOUR MOVE? 1
THERE ARE 8 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS LEAVING 6
YOUR MOVE? 1
THERE ARE 5 CHIPS ON THE BOARD.
COMPUTER TAKES 4 CHIPS LEAVING 1
YOUR MOVE? 1
GAME OVER ... I WIN! ! !

THERE ARE 9 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS LEAVING 7
YOUR MOVE? 4
THERE ARE 3 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS LEAVING 1
YOUR MOVE? 1
GAME OVER ... I WIN! ! !

THERE ARE 21 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS LEAVING 19
YOUR MOVE? 4
THERE ARE 15 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS LEAVING 13
YOUR MOVE? 3
THERE ARE 10 CHIPS ON THE BOARD.
```

```
COMPUTER TAKES 4 CHIPS LEAVING 6
YOUR MOVE? 4
THERE ARE 2 CHIPS ON THE BOARD.
COMPUTER TAKES 2 CHIPS.
GAME OVER ... I WIN! ! !
```

```
20  DIM R(1,5)
25  L=0: B=0
30  FOR I=0 TO 5
40  R(1,I)=4
50  R(0,I)=4
60  NEXT I
70  A=0: B=0
90  P=INT((13*RND(0)+9)/2)*2+1
100 IF P=1 THEN 530
110 PRINT "THERE ARE"; P; "CHIPS ON THE
    BOARD."
120 E1=E
130 L1=L
140 E=(A/2-INT(A/2))*2
150 L=INT((P/6-INT(P/6))*6+.5)
160 IF R(E,L)>=P THEN 320
170 M=R(E,L)
180 IF M<=0 THEN 370
190 P=P-M
200 IF M=1 THEN 510
210 PRINT "COMPUTER TAKES"; M; "CHIPS
```

```
    LEAVING"; P
215 PRINT "YOUR MOVE";
220 B=B+M
230 INPUT M
240 M=INT(M)
250 IF M<1 THEN 450
260 IF M>4 THEN 460
270 IF M>P THEN 460
280 IF M=P THEN 360
290 P=P-M
300 A=A+M
310 GOTO 100
320 IF P=1 THEN 550
330 PRINT "COMPUTER TAKES"; P; "CHIPS."
340 R(E,L)=P
350 B=B+P
360 IF B/2=INT(B/2) THEN 420
370 PRINT "GAME OVER ... YOU WIN! ! ! "
380 PRINT
390 IF R(E,L)=1 THEN 480
400 R(E,L)=R(E,L)-1
410 GOTO 70
420 PRINT "GAME OVER ... I WIN!!!": PRINT
430 GOTO 70
450 IF M=0 THEN 570
460 PRINT M; "IS AN ILLEGAL MOVE"
465 PRINT "YOUR MOVE";
```

```
470 GOTO 230
480 IF R(E1,L1)=1 THEN 70
490 R(E1,L1)=R(E1,L1)-1
500 GOTO 70
510 PRINT "COMPUTER TAKES 1 CHIP
    LEAVING"; P
515 PRINT "YOUR MOVE";
520 GOTO 220
530 PRINT "THERE IS 1 CHIP ON THE BOARD."
540 GOTO 120
550 PRINT "COMPUTER TAKES 1 CHIP."
560 GOTO 340
570 END
```

38. 骰点概率

本程序与其说是游戏，不如说是一种概率求算方法。模拟掷一对骰子，每一次可以得到两个骰点之和。你打入一个掷骰子的次数（它应是一个很大的数），计算机会打印出每一种数（两个骰点之和）出现的次数。指定的次数愈大，则愈接近理论值，如：

两骰点之和	概　　率	百 分 比
2	1/36	2.777…%
3	2/36	5.5555…%
4	3/36	8.3333…%
⋮	⋮	⋮

你可以试一下当次数为多少时，才能接近理论值？实际上此数应大于5000。

```
HOW MANY ROLLS? 10000

TOTAL SPOTS        NUMBER OF TIMES

 2                  312
 3                  543
 4                  820
 5                  1148
 6                  1395
 7                  1680
 8                  1330
 9                  1125
 10                 841
 11                 542
 12                 264

TRY AGAIN? YES

HOW MANY ROLLS? 100

TOTAL SPOTS        NUMBER OF TIMES

 2                  1
 3                  6
 4                  9
 5                  9
 6                  16
 7                  22
 8                  16
 9                  9
 10                 11
 11                 1
 12                 0
```

程序为：

```
10  DIM F(12)
```

```
80  FOR Q=1 TO 12
90  F(Q)=0
100 NEXT Q
110 PRINT: PRINT "HOW MANY ROLLS";
120 INPUT X
130 FOR S=1 TO X
140 A=INT(6*RND(0)+1)
150 B=INT(6*RND(0)+1)
160 R=A+B
170 F(R)=F(R)+1
180 NEXT S
185 PRINT
190 PRINT "TOTAL SPOTS", "NUMBER OF
    TIMES"
200 FOR V=2 TO 12
210 PRINT V, F(V)
220 NEXT V
222 PRINT: PRINT "TRY AGAIN";
223 INPUT Z$
224 IF Z$="YES" THEN 80
240 END
```

39. 标枪投靶

这个游戏最多允许二十个人参加，靶标分为 10 分、20 分、30 分、40 分四个区，以先打满 200 分者为胜。可以选择下述三种姿势进行投靶，每种姿势可能击中目标的情况如下：

掷　　法	姿　　势	可能击中哪一区
Ⅰ	手过肩快速掷出	击中靶心或飞出靶面
Ⅱ	手过肩仔细瞄准	击中 10,20,30分的区
Ⅲ	低手掷出	任何区都可能

以掷法 Ⅲ 为例，计算它可能得分的情况（请看 220 语句中的数据）。

击 中 区	概　　率	S×P
40	1.00－0.95＝0.05	2
30	0.95－0.75＝0.20	6
20	0.75－0.45＝0.30	6
10	0.45－0.05＝0.40	4
0	0.05－0.0 ＝0.05	0
	本掷法可能得分（平均值）	18

你可以同样计算出掷法Ⅰ和Ⅱ可能得分的概率。

经过计算情况如下：

击中区	掷　　法Ⅰ		掷　　法Ⅱ	
	概　　率	S×P	概　　率	S×P
40	1－0.65＝0.35	14	1－0.99＝0.01	0.4
30	0.65－0.55＝0.10	3	0.99－0.77＝0.22	6.6
20	0.55－0.5＝0.05	1	0.77－0.43＝0.34	6.8
10	0.5－0.5＝0	0	0.43－0.01＝0.42	4.2
0	0.5－0＝0.5	0	0.01－0＝0.01	0
本掷法可能得分（平均值）		17		17.6

游戏时，先指定参加游戏的人数，然后在每一轮中各人打入自己选择的掷法，计算机会告诉你投中哪一区，并累计得分。当有一个人积分超过 200 时，游戏就结束了。

```
HOW MANY PLAYERS? 2

NAME OF PLAYER # 1 ? STEVE
NAME OF PLAYER # 2 ? DARTH

ROUND 1

STEVE'S THROW? 1
30-POINT ZONE!
TOTAL SCORE=30
```

```
DARTH'S THROW? 2
WHEW!    10 POINIS.
TOTAL SCORE=10

ROUND 2

STEVE'S THROW? 3
MISSED THE TARGET!    TOO BAD.
TOTAL SCORE=30

DARTH'S THROW? 1
MISSED THE TARGET!    TOO BAD.
TOTAL SCORE=10

ROUND 3

STEVE'S THROW? 1
20-POINT ZONE
TOTAL SCORE=50

DARTH'S THROW? 1
MISSED THE TARGET!   TOO BAD.
TOTAL SCORE=10

ROUND 4

STEVE'S THROW? 2
MISSED THE TARGET!    TOO BAD.
TOTAL SCORE=50

DARTH'S THROW? 2
20-POINT ZONE
TOTAL SCORE=30
```

ROUND 5

STEVE'S THROW? 1

BULLSEYE! ! 40 POINTS!

TOTAL SCORE=90

DARTH'S THROW? 1

MISSED THE TARGET! TOO BAD.

TOTAL SCORE=30

ROUND 6

STEVE'S THROW? 1

30-POINT ZONE!

TOTAL SCORE=120

DARTH'S THROW? 2

WHEW! 10 POINTS.

TOTAL SCORE=40

ROUND 7

STEVE'S THROW? 2

WHEW! 10 POINTS.

TOTAL SCORE=130

DARTH'S THROW? 3

MISSED THE TARGET! TOO BAD.

TOTAL SCORE=40

ROUND 8

STEVE'S THROW? 1

BULLSEYE!! 40 POINTS!

TOTAL SCORE=170

```
DARTH'S THROW? 2
WHEW!   10 POINTS.
TOTAL SCORE=50

ROUND 9

STEVE'S THROW? 2
20-POINT ZONE
TOTAL SCORE=190

DARTH'S THROW? 1
MISSED THE TARGET!  TOO BAD.
TOTAL SCORE=50

ROUND 10

STEVE'S THROW? 2
20-POINT ZONE
TOTAL SCORE=210

DARTH'S THROW? 1
MISSED THE TARGET!  TOO BAD.
TOTAL SCORE=50

WE HAVE A WINNER! !
STEVE SCORED 210 POINTS.

THANKS FOR THE GAME.
```

```
100 DIM A$(20), S(20), W(10): M=0: R=0
105 FOR I=1 TO 20; S(I)=0: NEXT I
110 INPUT "HOW MANY PLAYERS"; N: PRINT
120 FOR I=1 TO N
```

```
130 PRINT ″NAME OF PLAYER #″； I；： INPUT
    A$(I)
140 NEXT I
150 R=R+1： PRINT： PRINT ″ROUND″； R
160 FOR I=1 TO N
170 PRINT： PRINT A$(I)； ″'S THROW″；
175 INPUT T
180 IF T<0 OR T>3 THEN PRINT ″INPUT 1, 2,
    OR 3! ″： GOTO 170
190 ON T GOTO 200, 210, 200
200 P1=.65： P2=.55： P3=.5： P4=.5： GOTO 230
210 P1=.99： P2=.77： P3=.43： P4=.01： GOTO
    230
220 P1=.95： P2=.75： P3=.45： P4=.05
230 U=RND(0)
240 IF U>=P1 THEN PRINT ″BULLSEYE! ! 40
    POINTS! ″： B=40： GOTO 290
250 IF U>=P2 THEN PRINT ″30-POINT ZONE!″：
    B=30： GOTO 290
260 IF U>=P3 THEN PRINT ″20-POINT ZONE″：
    B=20： GOTO 290
270 IF U>=P4 THEN PRINT ″WHEW! 10
    POINTS.″： B=10： GOTO 290
280 PRINT ″MISSED THE TARGET! TOO BAD.
    ″： B=0
290 S(I)=S(I)+B： PRINT ″TOTAL SCORE=″；
    S(I)： NEXT I
```

```
300 FOR I=1 TO N
310 IF S(I)>=200 THEN M=M+1: W(M)=I
320 NEXT I
330 IF M=0 THEN 150
340 PRINT: PRINT "WE HAVE A WINNER!! "
345 PRINT
350 FOR I=1 TO M: PRINT A$(W(I));
    "SCORED"; S(W(I)); "POINTS.": NEXT I
360 PRINT: PRINT "THANKS FOR THE
    GAME.": END
```

40. 猜　　拳

孩子们都爱玩“石头—剪刀—纸”的猜拳游戏。两人同时出手，手掌平伸代表“纸”，握拳代表“石头”，伸两个指头代表“剪刀”。石头砸剪刀（石头胜），剪刀剪纸（剪刀胜），纸包石头（纸胜）。

现在你和计算机玩这个游戏。以“1”代表纸，“2”代表剪刀，“3”代表石头。你打入 1、2 或3 表示你出纸、剪刀或石头，计算机也选择 1、2 或 3 中的一个数，之后判谁获胜。一局游戏可做十次，然后计分，计算机会告诉你各胜了几次，平了几次，输了几次。

```
30  INPUT "HOW MANY GAMES"; Q
40  IF Q<11 THEN 60
50  PRINT "SORRY, BUT WE AREN'T ALLOWED
    TO PLAY THAT MANY.": GOTO 30
60  FOR G=1 TO Q
70  PRINT: PRINT "GAME NUMBER"; G
```

```
80  X=INT(RND(0)*3+1)
90  PRINT "3=ROCK...2=SCISSORS...1=
    PAPER"
100 INPUT "1...2...3...WHAT'S YOUR
    CHOICE";K
110 IF (K-1)*(K-2)*(K-3)< >0 THEN PRINT
    "INVALID.": GOTO 90
120 PRINT "THIS IS MY CHOICE..."
130 ON X GOTO 140,150,160
140 PRINT "...PAPER": GOTO 170
150 PRINT "...SCISSORS": GOTO 170
160 PRINT "...ROCK"
170 IF X=K THEN 250
180 IF X>K THEN 230
190 IF X=1 THEN 210
200 PRINT "YOU WIN!!! ": H=H+1: GOTO 260
210 IF K< >3 THEN 200
220 PRINT "WOW! I WIN!!! ": C=C+1
225 GOTO 260
230 IF K< >1 OR X< >3 THEN 220
240 GOTO 200
250 PRINT "TIE GAME. NO WINNER."
260 NEXT G
270 PRINT: PRINT "HERE IS THE FINAL
    GAME SCORE:"
280 PRINT "I HAVE WON"; C; "GAME(S)."
290 PRINT "YOU HAVE WON"; H; "GAME(S)."
```

```
300 PRINT "AND"; Q-(C+H); "GAME(S)
    ENDED IN A TIE."
310 PRINT: PRINT "THANKS FOR PLAYING!!"
320 END
```

游戏记录如下：

```
HOW MANY GAMES? 10

GAME NUMBER 1
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 3
THIS IS MY CHOICE...
...PAPER
WOW!  I WIN!!!

GAME NUMBER 2
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 2
THIS IS MY CHOICE...
...ROCK
WOW! I WIN!!!

GAME NUMBER 3
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 2
THIS IS MY CHOICE...
...PAPER
YOU WIN!!!

GAME NUMBER 4
3=ROCK...2=SCISSORS...1=PAPER
```

1...2...3...WHAT'S YOUR CHOICE? 1
THIS IS MY CHOICE...
...ROCK
YOU WIN!!!

GAME NUMBER 5
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 3
THIS IS MY CHOICE...
...SCISSORS
YOU WIN!!!

GAME NUMBER 6
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 2
THIS IS MY CHOICE...
...SCISSORS
TIE GAME. NO WINNER.

GAME NUMBER 7
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 2
THIS IS MY CHOICE...
...ROCK
WOW! I WIN!!!

GAME NUMBER 8
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 3
THIS IS MY CHOICE...

```
...ROCK
TIE GAME. NO WINNER.
GAME NUMBER 9
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 1
THIS IS MY CHOICE...
...ROCK
YOU WIN! ! !
GAME NUMBER 10
3=ROCK...2=SCISSORS...1=PAPER
1...2...3...WHAT'S YOUR CHOICE? 2
THIS IS MY CHOICE...
...ROCK
WOW! I WIN! ! !
HERE IS THE FINAL GAME SCORE:
I HAVE WON 4 GAME(S).
YOU HAVE WON 4 GAME(S).
AND 2 GAME(S) ENDED IN A TIE.
```

41. 巧　　取

这是一个两人玩的游戏。把若干物品分放几堆，如：

××××××××××　　表示第一堆中有 10 件

××××××××　　表示第二堆中有 8 件

×××××××　　表示第三堆中有 7 件

×××　　表示第四堆中有 3 件

两个人轮流取走物品，每次取走的件数不限，但只能从一堆中取（不得从两堆或几堆中取）并规定取的件数不能超过该堆中当时的件数。

胜负的原则是：第一种方式规定谁拿最后一件为胜；第二种方式规定谁拿最后一件为负。游戏开始时你可以指定用第一方式还是用第二方式，还可以指定谁先取物（当计算机打印“DO YOU WANT TO MOVE FIRST”?你回答“NO”，表示你不先取，由计算机先取）。

下面的例子是选择第二方式。指定分四堆，第一堆 10 件，第二堆 8 件，第三堆 7 件，第四堆 3 件。计算机先取，它从第三堆中取走 6 件，所以接着打印出的各堆件数变成第一堆 10 件，第二堆 8 件，第三堆 1 件，第四堆 3 件。你打入“1,9”，表示从第一堆中取走 9 件，接着计算机又打印出你各和计算机取后的各堆的件数。你再从第二堆中取走 2 件，计算机从第 4 堆取走 3 件，计算机又打印出此时的情况。最后你又从第三堆中取走 1 件，此时只有第一、二堆中各有一件了，计算机只要任意取走一件，最后的一件只能由你来取，因此你输了。

```
ENTER WIN OPTION-1 TO TAKE LAST, 2 TO
  AVOID LAST? 2
ENTER NUMBER OF PILES? 4

ENTER PILE SIZES

 1  ?  10
 2  ?  8
 3  ?  7
 4  ?  3

DO YOU WANT TO MOVE FIRST? NO
```

```
PILE SIZE

 1    10
 2    8
 3    1
 4    3

YOUR MOVE－PILE,NUMBER TO BE REMOVED
?1,9

PILE SIZE

 1    1
 2    3
 3    1
 4    3
YOUR MOVE－PILE,NUMBER TO BE REMOVED
?2, 2
PILE SIZE

 1    1
 2    1
 3    1
 4    0

YOUR MOVE－PILE,NUMBER TO BE REMOVED
?3,1
MACHINE WINS
DO YOU WANT TO PLAY ANOTHER GAME?NO
```

程序为:

```
400 DIM A(100),B(100,10),D(2)
450 PRINT "ENTER WIN OPTION－1 TO TAKE
    LAST, 2 TO AVOID LAST";
460 INPUT W
470 IF W=1 THEN 490
```

```
480 IF W<>2 THEN 450
490 PRINT "ENTER NUMBER OF PILES";
500 INPUT N
510 IF N>100 THEN 490
520 IF N<1 THEN 490
540 PRINT "ENTER PILE SIZES"
550 FOR I=1 TO N
560 PRINT I;
570 INPUT A(I)
580 IF A(I)>2000 THEN 560
590 IF A(I)<1 THEN 560
600 IF  A(I)< >INT(A(I)) THEN 560
610 NEXT I
620 PRINT "DO YOU WANT TO MOVE FIRST";
630 INPUT Q9$
650 IF Q9$="YES" GOTO 1450
670 IF Q9$="NO" GOTO 700
680 PRINT "PLEASE. YES OR NO";
690 GOTO 630
700 IF W=1 THEN 940
710 LET C=0
720 FOR I=1 TO N
730 IF A(I)=0 THEN 770
740 LET C=C+1
750 IF C=3 THEN 840
```

```
760  LET D(C)=I
770  NEXT I
780  IF C=2 THEN 920
790  IF A(D(1))>1 THEN 820
800  PRINT "MACHINE LOSES"
810  GOTO 1640
820  PRINT "MACHINE WINS"
830  GOTO 1640
840  LET C=0
850  FOR I=1 TO N
860  IF A(I)>1 THEN 940
870  IF A(I)=0 THEN 890
880  LET C=C+1
890  NEXT I
900  IF C/2< >INT(C/2) THEN 800
910  GOTO 940
920  IF A(D((1))=1 THEN 820
930  IF A(D((2))=1 THEN 820
940  FOR I=1 TO N
950  LET E=A(I)
960  FOR J=0 TO 10
970  LET F=E/2
980  LET B(I,J)=2*(F-INT(F))
990  LET E=INT(F)
1000 NEXT J
1010 NEXT I
1020 FOR J=10 TO 0 STEP-1
```

```
1030 LET C=0
1040 LET H=0
1050 FOR I=1 TO N
1060 IF B(I,J)=0 THEN 1110
1070 LET C=C+1
1080 IF A(I)<=H THEN 1110
1090 LET H=A(I)
1100 LET G=I
1110 NEXT I
1120 IF C/2< >INT(C/2) THEN 1190
1130 NEXT J
1140 LET E=INT(N*RND(0)+1)
1150 IF A(E)=0 THEN 1140
1160 LET F=INT(A(E)*RND(0)+1)
1170 LET A(E)=A(E)-F
1180 GOTO 1380
1190 LET A(G)=0
1200 FOR J=0 TO 10
1210 LET B(G,J)=0
1220 LET C=0
1230 FOR I=1 TO N
1240 IF B(I,J)=0 THEN 1260
1250 LET C=C+1
1260 NEXT I
1270 LET A(G)=A(G)+2*(C/2-INT(C/2))*2↑J
1280 NEXT J
1290 IF W=1 THEN 1380
```

```
1300 LET C=0
1310 FOR I=1 TO N
1320 IF A(I)>1 THEN 1380
1330 IF A(I)=0 THEN 1350
1340 LET C=C+1
1350 NEXT I
1360 IF C/2< >INT(C/2) THEN 1380
1370 LET A(G)=1-A(G)
1380 PRINT "PILE SIZE"
1390 FOR I=1 TO N
1400 PRINT I; A(I)
1410 NEXT I
1420 IF W=2 THEN 1450
1430 GOSUB 1570
1440 IF Z=1 THEN 820
1450 PRINT "YOUR MOVE-PILE,NUMBER TO BE
     REMOVED"
1460 INPUT X, Y
1470 IF X>N THEN 1450
1480 IF X<1 THEN 1450
1490 IF X< >INT(X) THEN 1450
1500 IF Y>A(X) THEN 1450
1510 IF Y<1 THEN 1450
1520 IF Y< >INT(Y) THEN 1450
1530 LET A(X)=A(X)-Y
1540 GOSUB 1570
1550 IF Z=1 THEN 800
```

```
1560 GOTO 700
1570 LET Z=0
1580 FOR I=1 TO N
1590 IF A(I)=0 THEN 1610
1600 RETURN
1610 NEXT I
1620 LET Z=1
1630 RETURN
1640 PRINT "DO YOU WANT TO PLAY ANOTHER
     GAME";
1650 INPUT Q9$
1670 IF Q9$="YES" THEN 1720
1680 IF Q9$="NO" THEN 1730
1700 PRINT "PLEASE. YES OR NO";
1710 GOTO 1650
1720 GOTO 440
1730 END
```

42. 射击仰角

炮的仰角如果是 45°，则射击的距离最远，如果小于或大于 45°，距离就近些。程序每次随机地给出炮的最大射程（在 20000 码到 60000 码之间），杀伤范围为 100 码。你可以射击五次，程序每次给出目标与炮之间的距离，然后你指定一个射击的仰角，计算机会告诉你超过目标多少码或未到目标多少码。之后你再调整开炮的仰角，看几次能击中目标。

程序如下：

```
100 PRINT "YOU ARE THE OFFICER-IN-
    CHARGE, GIVING ORDERS TO A GUN"
140 PRINT "CREW, TELLING THEM THE
    DEGREES OF ELEVATION YOU ESTIMATE"
150 PRINT "WILL PLACE A PROJECTILE
    ON TARGET. A HIT WITHIN 100 YARDS"
160 PRINT "OF THE TARGET WILL DESTROY
    IT.": PRINT
170 R=INT(40000*RND(0)+20000)
180 PRINT "MAXIMUM RANGE OF YOUR GUN
    IS "; R; " YARDS."
185 Z=0
190 PRINT
195 S1=0
200 T=INT(R*(.1+.8*RND(0))
210 S=0
220 GOTO 370
230 PRINT "MINIMUM ELEVATION IS ONE
    DEGREE."
240 GOTO 390
250 PRINT "MAXIMUM ELEVATION IS 89
    DEGREES."
260 GOTO 390
270 PRINT "OVER TARGET BY"; ABS(E);
    "YARDS."
280 GOTO 390
290 PRINT "SHORT OF TARGET BY";ABS(E);
    "YARDS."
```

```
300 GOTO 390
320 PRINT "*** TARGET DESTROYED *** ";
    S;"ROUNDS OF AMMUNITION EXPENDED"
325 S1=S1+S
330 IF Z=4 THEN 490
340 Z=Z+1
345 PRINT
350 PRINT "THE FORWARD OBSERVER
    HAS SIGHTED MORE ENEMY
    ACTIVITY..."
360 GOTO 200
370 PRINT "DISTANCE TO THE TARGET IS"
    ; T;" YARDS."
390 PRINT
400 INPUT "ELEVATION"; B
420 IF B>89 THEN 250
430 IF B<1 THEN 230
440 S=S+1
442 IF S<6 THEN 450
444 PRINT: PRINT "BOOM !!!! YOU HAVE
    JUST BEEN DESTROYED";
446 PRINT "BY THE ENEMY.": PRINT: PRINT:
    PRINT: GOTO 495
450 B2=2*B/57.3: I=R*SIN(B2): X=T-I
455 E=INT(X)
460 IF ABS(E)<100 THEN 320
470 IF E>100 THEN 290
480 GOTO 270
```

```
490 PRINT: PRINT: PRINT"TOTAL ROUNDS
    EXPENDED WERE: "; S1
492 IF S1>18 THEN 495
493 PRINT "NICE SHOOTING!!": GOTO 500
495 PRINT "BETTER GO BACK TO FORT SILL
    FOR REFRESHER TRAINING!"
500 PRINT: INPUT "TRY AGAIN (Y OR N)"; Z$
510 IF Z$="Y" THEN 170
520 PRINT "OK. RETURN TO BASE CAMP."
999 END
```

运行记录为:

```
YOU ARE THE OFFICER-IN-CHARGE,
    GIVING ORDERS TO A GUN
CREW, TELLING THEM THE DEGREES OF
    ELEVATION YOU ESTIMATE
WILL PLACE A PROJECTILE ON TARGET.
    A HIT WITHIN 100 YARDS
OF THE TARGET WILL DESTROY IT.
MAXIMUN RANGE OF YOUR GUN IS 55684
    YARDS.
DISTANCE TO THE TARGET IS 15755
    YARDS.
ELEVATION? 9
OVER TARGET BY 1452 YARDS.
ELEVATION? 8
SHORT OF TARGET BY 407 YARDS.
ELEVATION? 8.2
```

```
*** TARGET DESTROYED *** 3 ROUNDS OF
    AMMUNITION EXPENDED
THE FORWARD OBSERVER HAS SIGHTED
    MORE ENEMY ACTIVITY...
DISTANCE TO THE TARGET IS 11349 YARDS.
ELEVATION? 84
OVER TARGET BY 241 YARDS.
ELEVATION? 84.1
*** TARGET DESTROYED *** 2 ROUNDS OF
    AMMUNITION EXPENDED
THE FORWARD OBSERVER HAS SIGHTED
    MORE ENEMY ACTIVITY...
DISTANCE TO THE TARGET IS 19146 YARDS.
ELEVATION? 11
OVER TARGET BY 1713 YARDS.
ELEVATION? 10
SHORT OF TARGET BY 102 YARDS.
ELEVATION? 10.06
*** TARGET DESTROYED *** 3 ROUNDS OF
    AMMUNITION EXPENDED
THE FORWARD OBSERVER HAS SIGHTED
    MORE ENEMT ACTIVITY...
DISTANCE TO THE TARGET IS 10792 YARDS.
ELEVATION? 84.3
OVER TARGET BY 227 YARDS.
ELEVATION? 84.4
```

```
*** TARGET DESTROYED *** 2 ROUNDS OF
    AMMUNITION EXPENDED

THE FORWARD OBSERVER HAS SIGHTED
    MORE ENEMY ACTIVITY...
DISTANCE TO THE TARGET IS 36976 YARDS.

ELEVATIOH? 21
OVER TARGET BY 282 YARDS.

ELEVATION? 20.8
*** TARGET DESTROYED *** 2 ROUNDS OF
    AMMUNITION EXPENDED

TOTAL ROUNDS EXPENDED WERE: 12
NICE SHOOTING!!

TRY AGAIN (Y OR N)? N
OK. RETURN TO BASE CAMP.
```

43. 化学爆炸

把硫酸冲淡成稀溶液，必须按三份硫酸七份水的比例相混合，如果不按这样的比例，则溶液会因不稳定而引起爆炸。计算机给出硫酸的体积（升），要求你打入应加的水的体积。如果你的计算误差超过理论值 5%，就算错一次，你的生命就受到一次威胁。但你最多只能冒九次险，在遇到第九次威胁时，你就丧生了。

例如，第一次计算机给出硫酸为 32 升，你回答加水 77 升，误差<5%，正确，计算机打出“GOOD JOB!”。第二次

硫酸为 11 升，你加水 27 升，误差>5%，错了，溶液发出“吱吱”声（SIZZLE），即将爆炸。

32 LITERS OF KRYPTOCYANIC ACID. HOW MUCH WATER? 77

GOOD JOB!

11 LITERS OF KRPYTOCYANIC ACID. HOW MUCH WATER?27

SIZZLE! YOU HAVE JUST BEEN DESALINATED INTO A BLOB

OF QUIVERING PROTOPLASM!

HOWEVER, YOU MAY TRY AGAIN WITH ANOTHER LIFE.

26 LITERS OF KRYPYTOCYANIC ACID. HOW MUCH WATER? 28

SIZZLE! YOU HAVE JUST BEEN DESALINATED INTO A BLOB

OF QUIVERING PROTOPLASM!

HOWEVER, YOU MAY TRY AGAIN WITH ANOTHER LIFE.

47 LITERS OF KRYPTOCYANIC ACID. HOW MUCH WATER? 82

SIZZLE! YOU HAVE JUST BEEN

DESALINATED INTO A BLOB

OF QUIVERING PROTOPLASM!

HOWEVER, YOU MAY TRY AGAIN WITH ANOTHER LIFE.

27 LITERS OF KRYPTOCYANIC ACID. HOW MUCH WATER? 63

GOOD JOB!

```
5 LITERS OF KRYPTOCYANIC ACID.HOW
      MUCH WATER? 9
SIZZLE! YOU HAVE JUST BEEN
      DESALINATED INTO A BLOB
OF QUIVERING PROTOPLASM!
HOWEVER, YOU MAY TRY AGAIN WITH
      ANOTHER LIFE.
11 LITERS OF KRYPTOCYANIC ACID. HOW
      MUCH WATER? 28
SIZZLE! YOU HAVE JUST BEEN
      DESALINATED INTO A BLOB
OF QUIVERING PROTOPLASM!
HOWEVER YOU MAY TRY AGAIN WITH
      ANOTHER LIFE.
48 LITERS OF KRYPTOCYANIC ACID. HOW
      MUCH WATER?
```

程序为:

```
100 A=INT(RND(0)*50)
110 W=7*A/3
120 PRINT A;"LITERS OF KRYPTOCYANIC
    ACID. HOW MUCH WATER";
130 INPUT R
140 D=ABS(W-R)
150 IF D>W/20 THEN 200
160 PRINT "GOOD JOB! "
170 PRINT
180 GOTO 100
200 PRINT "SIZZLE! YOU HAVE JUST BEEN
```

```
    DESALINATED INTO A BLOB"
210 PRINT "OF QUIVERING PROTOPLASM! "
220 T=T+1
230 IF T=9 THEN 260
240 PRINT "HOWEVER, YOU MAY TRY AGAIN
    WITH ANOTHER LIFE."
250 GOTO 100
260 PRINT "YOUR 9 LIVES ARE USED, BUT
    YOU WILL BE LONG REMEMBERED FOR"
270 PRINT "YOUR CONTRIBUTIONS TO THE
    FIELD OF COMIC BOOK CHEMISTRY."
280 END
```

44. 坐圈游戏

若干个人围坐一圈，每人有一个号(1 号、2 号、3 号……)。从第一个人开始数起，每数到 5 时，这个人就从圈子出来，再继续数 1，2，3…，5，数到第 5 个人，另一个人又出来，凡是从圈子中出来的人的位置就空着，下次不再数。如此不断继续数下去，直到全部人都从圈子出来为止。你能指出从圈子中出来的人的顺序吗？如第一个出来的是 5 号，第二个出来的是 10 号……。

即：

ORDER (次序)	NO. (号码)	
1	5#	(第一个出来的是 5 号)
2	10#	(第二个出来的是 10 号)
3	2#	
4	8#	
5	1#	

6	9#
7	4#
8	13#
9	12#
10	3#
11	7#
12	11#
13	6#

程序如下：

```
5   M=13
8   N=5
10  DIM A(M)
20  FOR I=1 TO M
30  A(I)=1
40  NEXT I
50  S=0
60  P=0
65  PRINT "ORDER", "NO."
70  FOR I=1 TO M
80  S=S+A(I)
90  IF S< >N THEN 110
100 GOSUB 130
110 NEXT I
120 GOTO 70
130 S=0
140 A(I)=0
```

```
150 P=P+1
160 PRINT P, I; "#"
170 IF P=M THEN 999
180 RETURN
999 END
```

可以通过改变5语句和8语句来改变 M 和 N，譬如 95 人围圈，每数到第7时，此人出圈。

```
5   M=95
8   N=7
```

也可以用键盘输入 M、N，这样使用更灵活：

```
5  INPUT M, N
```

取消 8 语句。

45. 皮球弹跳

用计算机模拟一个皮球的弹跳。你可以任意指定皮球上抛的初始速度，然后皮球垂直下落，着地后又弹起向上跳。你还可以指定球的回弹系数（它应该小于1）。计算机用图来表示时间与高度的关系，以横坐标表示时间（秒），纵坐标表示高度（米）。你可以指定横轴的时间增量即每隔多少时间画出一个点，一般指定增量为 0.1 秒。

THIS SIMULATION LETS YOU SPECIFY THE INITIAL VELOCITY OF A BALL THROWN STRAIGHT UP, AND THE COEFFICIENT OF ELASTICITY OF THE BALL.

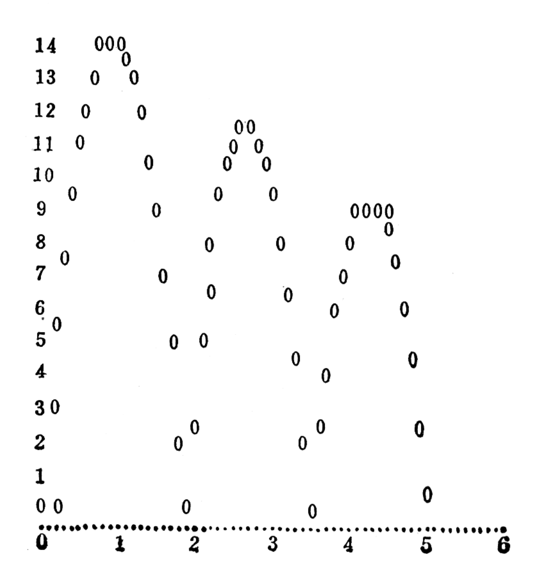
PLEASE USE A DECIMAL FRACTION COEFFICIENCY (LESS THAN 1).

YOU ALSO SPECIFY THE TIME INCREMENT TO BE USED IN 'STROBING' THE BALL'S FLIGHT (TRY.1 INITIALLY).

TIME INCREMENT(SEC)? .1

VELOCITY (FPS)? 30

COEFFICIENT ?.9



```
100  DIM T(20)
105 PRINT "THIS SIMULATION LETS YOU
    SPECIFY THE"
110 PRINT " INITIAL VELOCITY OF A BALL
      THROWN"
115 PRINT" STRAIGHT UP, AND THE
      COEFFICIENT OF"
120 PRINT "ELASTICITY OF THE BALL."
125 PRINT "PLESASE USE A DECIMAL
      FRACTION"
130 PRINT "COEFFICIENCY (LESS THAN 1)."
131 PRINT
132 PRINT "YOU ALSO SPECIFY THE TIME
    INCREMENT"
133 PRINT "TO BE USED IN 'STROBING' THE
      BALL'S"
134 PRINT "FLIGHT(TRY .1 INITIALLY)."
135 PRINT
136 INPUT "TIME INCREMENT (SEC)"; S2
150 INPUT "VELOCITY (MPS)"; V
170 INPUT "COEFFICIENT"; C
180 PRINT
186 S1=INT(70/(V/(16*S2)))
190 FOR I=1 TO S1
200 T(I)=V*C↑(I-1)/16
210 NEXT I
```

```
220 FOR H = INT( - 16*(V/32) ↑ 2 + V ↑ 2/32 + .5) TO
    0 STEP - .5
221 IF INT(H)< >H THEN 225
222 PRINT H;
225 L = 0
230 FOR I = 1 TO S1
240 FOR T = 0 TO T(I) STEP S2
245 L = L + S2
250 IF ABS(H - (.5*( - 32)*T ↑ 2 + V*C ↑ (I - 1)*T))
    >.25 THEN 270
260 PRINT TAB(L/S2); "0";
270 NEXT I
275 T = T(I + 1)/2
276 IF - 16*T ↑ 2 + V*C ↑ (I - 1)*T<H THEN 290
280 NEXT I
290 PRINT
300 NEXT H
310 PRINT TAB(1);
320 FOR I = 1 TO INT(L + 1)/S2 + 1
330 PRINT ".";
340 NEXT I
350 PRINT
355 PRINT " 0";
360 FOR I = 1 TO INT(L + .9995)
380 PRINT TAB(INT(I/S2)); I;
390 NEXT I
400 PRINT
```

```
420 PRINT
430 GOTO 135
440 END
```

46. 巧 排 序

计算机给出9个一位整数，请你在尽可能少的次数内把它按顺序排列好。办法是：你向计算机打入一个数 n，计算机就会将原数列中第 n 个数（从左数起）以左的 n 个数倒过来排列。假如原数列为：

2 3 4 5 1 6 7 8 9

你如果打入“4”，则前面四个数的次序便倒过来，数列变成：

5 4 3 2 1 6 7 8 9

若再打入“5”，则成了：

1 2 3 4 5 6 7 8 9

这样就实现了按顺序排列的目的。你能在几次之内达到这一目的？若你想停止，可打入“0”。

```
NO DOUBT YOU WILL LIKE THIS GAME,BUT
IF YOU WANT TO QUIT, REVERSE 0 (ZERO).

HERE WE GO ... THE LIST IS:

 2   4   5   1   9   6   3   7   8

HOW MANY SHALL I REVERSE? 9

 8   7   3   6   9   1   5   4   2

HOW MANY SHALL I REVERSE? 4

 6   3   7   8   9   1   5   4   2
```

```
HOW MANY SHALL I REVERSE? 5
9  8  7  3  6  1  5  4  2
HOW MANY SHALL I REVERSE? 9
2  4  5  1  6  3  7  8  9
HOW MANY SHALL I REVERSE? 3
5  4  2  1  6  3  7  8  9
HOW MANY SHALL I REVERSE? 4
1  2  4  5  6  3  7  8  9
HOW MANY SHALL I REVERSE? 6
3  6  5  4  2  1  7  8  9
HOW MANY SHALL I REVERSE? 4
4  5  6  3  2  1  7  8  9
HOW MANY SHALL I REVERSE? 3
6  5  4  3  2  1  7  8  9
HOW MANY SHALL I REVERSE? 6
1  2  3  4  5  6  7  8  9
YOU WON IT IN 10 MOVES!!!
TRY AGAIN (YES OR NO)? NO
O.K. HOPE YOU HAD FUM!!
```

```
100 DIM A(20)
140 REM * * * N=NUMBER OF NUMBERS
150 N=9
200 REM * * * MAKE A RANDOM LIST A(1)
    TO A(N)
210 A(1)=INT((N-1)*RND(0)+2)
220 FOR K=2 TO N
230 A(K)=INT(N*RND(0)+1)
240 FOR J=1 TO K-1
250 IF A(K)=A(J) THEN 230
260 NEXT J: NEXT K
280 REM *** PRINT ORIGINAL LIST AND START
    GAME
290 PRINT: PRINT "HERE WE GO ... THE
    LIST IS: "
310 T=0
320 GOSUB 610
330 PRINT "HOW MANY SHALL I REVERSE";
340 INPUT R
350 IF R=0 THEN 520
360 IF R<=N THEN 390
370 PRINT "OOPS! TOO MANY! I CAN REVERSE
    AT MOST"; N: GOTO 330
390 T=T+1
400 REM *** REVRESE R NUMBERS AND PRINT
    NEW LIST
410 FOR K=1 TO INT(R/2)
```

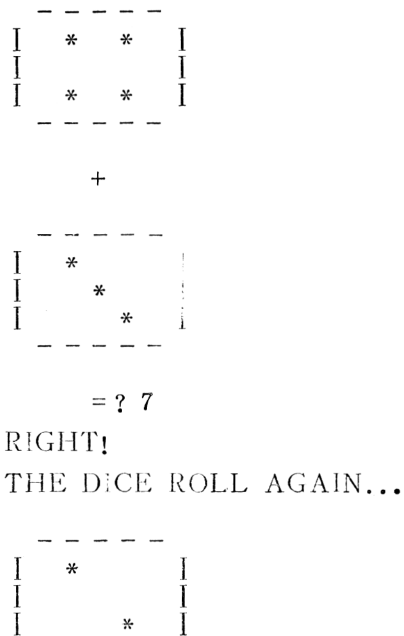
```
420 Z=A(K)
430 A(K)=A(R-K+1)
440 A(R-K+1)=Z
450 NEXT K
460 GOSUB 610
470 REM *** CHECK FOR A WIN
480 FOR K=1 TO N
490 IF A(K)< >K THEN 330
500 NEXT K
510 PRINT "YOU WON IT IN"; T; "MOVES!!!"
520 PRINT
530 PRINT "TRY AGAIN (YES OR NO)";
540 INPUT A$
550 IF A$="YES" THEN 210
560 PRINT: PRINT "O.K. HOPE YOU HAD
    FUN!!": GOTO 999
600 REM *** SUBROUTINE TO PRINT LIST
610 PRINT: FOR K=1 TO N: PRINT A(K);
615 NEXT K
650 PRINT: PRINT: RETURN
999 END
```

47. 数骰点

计算机产生两个骰子的图案，它们表示出每个骰子的点数，然后问你“两个骰子的点数之和=？”，你答得对，就打印出“RIGHT”，你答错了，让你再答一次，还未答对，计算机

就会告诉你是多少。

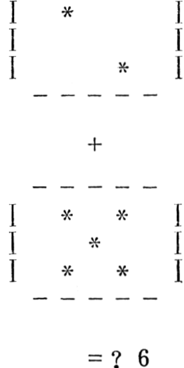
这个游戏可以用于幼儿练习数点子用。



=？7

RIGHT!

THE DICE ROLL AGAIN...



=？6

NO, COUNT THE SPOTS AND GIVE ANOTHER ANSWER.

```
        =? 5
NO, THE ANSWER IS 7
THE DICE ROLL AGAIN...

  -----
I  *     I
I        I
I     *  I
  -----

       +

  -----
I  *  *  I
I  *  *  I
I  *  *  I
  -----

        =? 8
RIGHT!
```

程序如下：

```
100 N=N+1
110 D=INT(6*RND(0)+1)
120 PRINT" - - - - - "
130 IF D=1 THEN 200
140 IF D=2 THEN 180
150 IF D=3 THEN 180
160 PRINT "I  *  *  I"
170 GOTO 210
180 PRINT "I *      I"
190 GOTO 210
200 PRINT "I        I"
```

```
210 IF D=2 THEN 260
220 IF D=4 THEN 260
230 IF D=6 THEN 270
240 PRINT "I   *  I"
250 GOTO 280
260 PRINT "I        I"
265 GOTO 280
270 PRINT "I  *  *  I"
280 IF D=1 THEN 350
290 IF D=2 THEN 330
300 IF D=3 THEN 330
310 PRINT "I  *  *  I"
320 GOTO 360
330 PRINT "I     *  I"
340 GOTO 360
350 PRINT "I        I"
360 PRINT "------"
370 PRINT
375 IF N=2 THEN 500
380 PRINT "    +"
381 PRINT
400 A=D
410 GOTO 100
500 T=D+A
510 PRINT "        =";
520 INPUT T1
530 IF T1=T THEN 590
```

```
540 PRINT "NO, COUNT THE SPOTS AND
    GIVE ANOTHER ANSWER."
541 PRINT "      =";
550 INPUT T2
560 IF T2=T THEN 590
570 PRINT "NO, THE ANSWER IS"; T
580 GOTO 600
590 PRINT "RIGHT!"
600 PRINT
601 PRINT "THE DICE ROLL AGAIN..."
610 PRINT
615 N=0
620 GOTO 100
999 END
```

48. 掷双骰

同时掷两个骰子看它们的点数之和，如果第一次掷后两个骰点数之和是 7 或 11，则算胜利，胜一次得 100 分；如果点数之和是 2 、3 或 1 、2 ，则算输，输一次减 100分；如果是 4、5、6、8、9、10，就要重掷。如果第二次掷的结果等于你刚才第一次得到的点数和（即 4、5、6、8、9、10 中之一，譬如第一次得 6 ，第二次也得 6 ）则算赢，得双倍分即 200 分；如果得 7 ，则算输。

开始时，你的分数为 0。胜（负）一次后，计算机问你是否再玩下一次，你打入“1”表示玩，打入“2”表示不再玩，这时计算机就会打印出游戏的总结了。

```
50  LET R=0
```

```
60  F=100
70  PRINT
80  PRINT "I WILL NOW THROW THE DICE"
90  E=INT(7*RND(0))
100 S=INT (7*RND(0))
110 X=E+S
120 IF X=0 THEN 90
140 IF X=1 THEN 90
150 IF X=7 THEN 270
160 IF X=11 THEN 270
170 IF X=2 THEN 300
190 IF X=3 THEN 350
200 IF X=12 THEN 350
205 IF X=4 THEN 420
210 IF X=5 THEN 420
220 IF X=6 THEN 420
230 IF X=8 THEN 420
240 IF X=9 THEN 420
250 IF X=10 THFN 420
270 PRINT X; " MATURAL.... A WINNER!!!"
280 PRINT X; "YOU WIN "; F
290 GOTO 390
300 PRINT X;" SNAKE EYES....YOU LOSE"
310 PRINT"YOU LOSE "; F
320 F=0-F
330 PRINT
340 GOTO 390
```

```
350 PRINT X; " CRAPS.....YOU LOSE"
360 PRINT"YOU LOSE  "; F
370 F=0-F
390 R=R+F
410 GOTO 650
420 PRINT X; " POINT I WILL ROLL  AGAIN"
430 H=INT(7*RND(0))
440 Q=INT(7*RND(0))
450 W=H+Q
460 IF  W=1  THEN 430
470 IF  W=7  THEN 520
480 IF  W=0  THEN 430
490 IF  W=X  THEN 580
500 PRINT W;" NO POINT I WILL ROLL AGAIN"
510 GOTO 430
520 PRINT W;" CRAPS YOU LOSE"
530 PRINT"YOU LOSE "; F
540 F=0-F
560 GOTO 390
570 GOTO 650
580 PRINT X;" A WINNER.....CONGRATS!!!"
590 PRINT X;" AT 2 TO 1 ODDS PAYS YOU...
    LET ME SEE..."; 2*F
600 F=2*F
620 GOTO 390
650 IF R<0 THEN 680
660 IF R>0 THEN 700
```

```
670 IF R=0 THEN 720
680 PRINT"YOU ARE UNDER "; -R
690 GOTO 730
700 PRINT"YOU ARE NOW AHEAD "; R
710 GOTO 730
720 PRINT"YOU ARE NOW EVEN AT 0"
730 PRINT
740 PRINT"IF YOU WANT TO PLAY AGAIN
    PRINT 1 IF NOT PRINT 2";
750 INPUT M
760 IF M=1 THEN 60
770 IF R<0 THEN 800
780 IF R>0 THEN 820
790 IF R=0 THEN 840
800 PRINT"TOO BAD, YOU ARE IN THE HOLE.
    COME AGRIN; "
810 GOTO 850
820 PRINT"CONGRATULATIONS----YOU
    CAME OUT A WINNER. COME AGAIN!"
830 GOTO 850
840 PRINT"CONGRATULATIONS----YOU
    CAME OUT EVEN, NOT BAD FOR AN
    AMATEUR"
850 PRINT
870 END
```

游戏记录如下：

```
I WILL NOW THROW THE DICE
```

```
6 POINT I WILL ROLL AGAIN
4 NO POINT I WILL ROLL AGAIN
11 NO POINT I WILL ROLL AGAIN
12 NO POINT I WILL ROLL AGAIN
8 NO POINT I WILL ROLL AGAIN
11 NO POINT I WILL ROLL AGAIN
2 NO POINT I WILL ROLL AGAIN
8 NO POINT I WILL ROLL AGAIN
8 NO POINT I WILL ROLL AGAIN
5 NO POINT I WILL ROLL AGAIN
6 A WINNER.....CONGRATS!!!
6 AT 2 TO 1 ODDS PAYS YOU...LET ME SEE
   ...200
YOU ARE NOW AHEAD 200
IF YOU WANT TO PLAY AGAIN PRINT 1 IF
   NOT PRINT 2? 1

I WILL NOW THROW THE DICE
9 POINT I WILL ROLL AGAIN
4 NO POINT I WILL ROLL AGAIN
8 NO POINT I WILL ROLL AGAIN
6 NO POINT I WILL ROLL AGAIN
7 CRAPS YOU LOSE
YOU LOSE 100
YOU ARE NOW AHEAD 100
IF YOU WANT TO PLAY AGAIN PRINT 1 IF
   NOT PRINT 2? 1
```

```
I WILL NOW THROW THE DICE
8 POINT I WILL ROLL AGAIN
9 NO POINT I WILL ROLL AGAIN
9 NO POINT I WILL ROLL AGAIN
8 A WINNER.....CONGRATS!!!
8 AT 2 TO 1 ODDS PAYS YOU...LET ME SEE
    ...200
YOU ARE NOW AHEAD 300
IF YOU WANT TO PLAY AGAIN PRINT 1 IF
    NOT PRINT 2? 1
I WILL NOW THROW THE DICE
3 CRAPS .... YOU LOSE
YOU LOSE 100
YOU ARE NOW AHERD 200
IF YOU WANT TO PLAY AGAIN PRINT 1 IF
   NOT PRINT 2? 2
CONGRATULATIONS----YOU CAME OUT
   A WINNER. COM  AGAIN!
```

49. 玩扑克

这是一个模拟猜扑克点数的游戏。由计算机代你抽出了两张扑克牌，然后你决定和打入这次的胜(负)所加(减)的分数。计算机再模拟产生一个扑克牌的点数，如果它的点数正好落在你的二张牌的点数范围之内，算你赢；否则为你输。

本程序规定开始时你的分数定为 100，如果你想改变这个值，可以改变 110 语句，使 Q 大于或小于 100。

如果你的分数全输光了，此游戏则结束一局。然后计算机询问你要不要再玩一次？如要，打入“ YES”，否则，打入“NO”，游戏就结束了。

下面是游戏记录：

```
YOU NOW HAVE 100
HERE ARE YOUR NEXT TWO CARDS
 2
 9
WHAT IS YOUR BET? 25
QUEEN
SORRY, YOU LOSE
YOU NOW HAVE 75
HERE ARE YOUR NEXT TWO CARDS
 4
10
WHAT IS YOUR BET?25
10
SORRY, YOU LOSE
YOU NOW HAVE 50
HERE ARE YOUR NEXT TWO CARDS
 6
10
WHAT IS YOUR BET?20
```

```
10
SORRY, YOU NOW HAVE 30
HERE ARE YOUR NEXT TWO CARDS
 9
JACK
WHAT IS YOUR BET?0
CHICKEN!!
```

程序为：

```
100 N=100
110 Q=100
120 PRINT"YOU NOW HAVE "; Q
130 PRINT
140 GOTO 260
210 Q=Q+M
220 GOTO 120
240 Q=Q-M
250 GOTO 120
260 PRINT"HERE ARE YOUR NEXT TWO
    CARDS"
270 A=INT(14*RND(0))+2
280 IF A<2 THEN 270
290 IF A>14 THEN 270
300 B=INT(14*RND(0))+2
310 IF B<2 THEN 300
320 IF B>14 THEN 300
330 IF A>=B THEN 270
350 IF A<11 THEN 400
```

```
360 IF A=11 THEN 420
370 IF A=12 THEN 440
380 IF A=13 THEN 460
390 IF A=14 THEN 480
400 PRINT A
410 GOTO 500
420 PRINT"JACK"
430 GOTO 500
440 PRINT"QUEEN"
450 GOTO 500
460 PRINT"KING"
470 GOTO 500
480 PRINT"ACE"
500 IF B<11 THEN 550
510 IF B=11 THEN 570
520 IF B=12 THEN 590
530 IF B=13 THEN 610
540 IF B=14 THEN 630
550 PRINT B
560 GOTO 650
570 PRINT"JACK"
580 GOTO 650
590 PRINT"QUEEN"
600 GOTO 650
610 PRINT"KING"
620 GOTO 650
630 PRINT"ACE"
```

```
640 PRINT
660 INPUT"WHAT IS YOUR BET";M
670 IF M< >0 THEN 680
675 PRINT"CHICKEN!!"
676 PRINT
677 GOTO 260
680 IF M<=Q THEN 730
690 PRINT"SORRY, MY FRIEND BUT  YOU  BET
    TOO MUCH"
700 PRINT"YOU HAVE ONLY ";Q;"TO BET"
710 GOTO 650
730 C=INT(14*RND(0))+2
740 IF C<2 THEN 730
750 IF C>14 THEN 730
760 IF C<11 THEN 810
770 IF C=11 THEN 830
780 IF C=12 THEN 850
790 IF C=13 THEN 870
800 IF C=14 THEN 890
810 PRINT C
820 GOTO 910
830 PRINT"JACK"
840 GOTO 910
850 PRINT"QUEEN"
860 GOTO 910
870 PRINT"KING"
880 GOTO 910
```

```
890 PRINT "ACE"
900 PRINT
910 IF C>A THEN 930
920 GOTO 970
930 IF C>=B THEN 970
950 PRINT"YOU WIN!!!"
960 GOTO 210
970 PRINT"SORRY, YOU LOSE"
980 IF M<Q THEN 240
990 PRINT
1000 PRINT
1010 PRINT"SORRY, FRIEND BUT YOU BLEW
        YOUR WAD"
1020 INPUT"TRY AGAIN (YES OR NO)";A$
1030 IF A$="YES" THEN 110
1040 PRINT"OK HOPE YOU HAD FUN"
1050 END
```

50. 出　牌

由计算机模拟两个人比出牌的大小，计算机先给你随机地分一张牌。例如 S-7，表示 SPADE-7（黑桃 7），D-K 表示 Diamond-K（方块 K），C 为梅花，H 为红心。另外又给计算机分配一张牌，然后比较这两张牌的大小，胜者得1分。每次计算机会打印出你和计算机两方中哪一方胜，并将以前各次得分累加后打印出来。最后问你是否想继续玩下去，你

如想继续玩，打入“YES”，否则打入“NO”。当用完 52 张牌（即比完 26 次）后本游戏结束。

```
YOU: S-10        COMPUTER: S-2
YOU WIN. YOU HAVE 1, COMPUTER HAS 0
DO YOU WANT TO CONTINUE? YES
YOU: S-9         COMPUTER: H-J
COMPUTER WINS !!! YOU HAVE 1,COMPUTER
    HAS 1
DO YOU WANT TO CONTINUE? YES
YOU: S-5         COMPUTER: D-3
YOU WIN.YOU HAVE 2,COMPUTER HAS 1
DO YOU WANT TO CONTINUE? YES
YOU: S-K         COMPUTER: H-Q
YOU WIN. TOU HAVE 3, COMPUTER HAS 1
DO YOU WANT TO CONTINUE? YES
YOU: C-10        COMPUTER: C-8
YOU WIN. YOU HAVE 4, COMPUTER HAS 1
DO YOU WANT TO CONTINUE? YES
YOU: H-5         COMPUTER: C-5
TIE. NO SCORE CHANGE.
DO YOU WANT TO CONTINUE? YES
YOU: H-A         COMPUTER: S-4
YOU WIN. YOU HAVE 5, COMPUTER HAS 1
DO YOU WANT TO CONTINUE? YES
YOU: D-K         COMPUTER: C-K
TIE. NO SCORE CHANGE.
```

```
DO YOU WANT TO CONTINUE? YES
YOU: C-3        COMPUTER: C-9
COMPUTER WINS!!! YOU HAVE 5,COMPUTER
   HAS 2
DO YOU WANT TO CONTINUE? YES
YOU: H-7        COMPUTER: C-Q
COMPUTER WINS!!! YOW HAVE 5,COMPUTER
   HAS 3
DO YOU WANT TO CONTINUE? YES
```

程序为：

```
200 DIM A$(52), L(54)
240 FOR I=1 TO 52
250 READ A$(I)
260 NEXT I
270 REM
280 FOR J=1 TO 52
290 LET L(J)=INT(52*RND(0))+1
295 IF J=1 THEN 350
300 FOR K=1 TO J-1
310 IF L(K)< >L(J) THEN 340
320 REM
330 GOTO 290
340 NEXT K
350 NEXT J
360 P=P+1
370 M1=L(P)
```

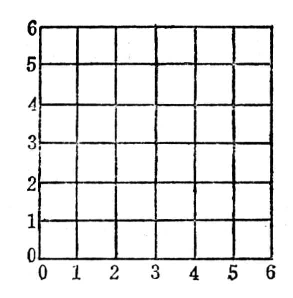
```
380 P=P+1
390 M2=L(P)
400 PRINT
420 PRINT "YOU: ";A$(M1), "COMPUTER: ";
    A$(M2)
430 N1=INT((M1-.5)/4)
440 N2=INT((M2-.5)/4)
450 IF N1>=N2 THEN 490
460 A1=A1+1
470 PRINT "COMPUTER WINS!!! YOU HAVE";
    B1;", COMPUTER HAS"; A1
480 GOTO 540
490 IF N1=N2 THEN 530
500 B1=B1+1
510 PRINT "YOU WIN. YOU HAVE";B1;
    ",COMPUTER HAS";A1
520 GOTO 540
530 PRINT "TIE. NO SCORE CHANGE."
540 IF L(P+1)=0 THEN 610
550 PRINT "DO YOU WANT TO  CONTINUE";
560 INPUT V$
570 IF V$="YES" THEN 360
580 IF V$="NO" THEN 650
590 PRINT "YES OR NO, PLEASE. ";
600 GOTO 540
610 PRINT
620 PRINT
```

```
630 PRINT "YOU HAVE RUN OUT OF CARDS.
    FINAL SCORE: YOU—";B1;
640 PRINT "; COMPUTER—";A1
650 PRINT "THANKS FOR PLAYING. IT WAS
    FUN."
660 DATA "S-2", "H-2", "C-2", "D-2",
    "S-3", "H-3", "C-3", "D-3"
670 DATA "S-4", "H-4", "C-4", "D-4",
    "S-5", "H-5", "C-5", "D-5"
680 DATA "S-6", "H-6", "C-6", "D-6",
    "S-7", "H-7", "C-7", "D-7"
690 DATA "S-8", "H-8", "C-8", "D-8",
    "S-9", "H-9", "C-9", "D-9"
700 DATA "S-10", "H-10", "C-10", "D-10",
    "S-J", "H-J", "C-J", "D-J"
710 DATA "S-Q", "H-Q", "C-Q", "D-Q",
    "S-K", "H-K", "C-K", "D-K"
720 DATA "S-A", "H-A", "C-A", "D-A"
999 END
```

51. 打敌舰

敌方有一个舰队布置在 6 × 6 的阵地内，这个舰队包括六艘舰：两艘驱逐舰（destroy），以数字“1”和“2”表示之，每艘驱逐舰占两个单位长度。两艘巡洋舰（cruiser），以“3”和“4”表示之，每艘占三个单位长度。两艘航空母舰（aircraft）以

“5”和“6”表示之，每舰占四个单位长度。



开始时，计算机布防。然后你攻击对方，打入两个数字（中间隔以逗号），表示攻击某一位置，如“3，4”，表示横轴（X 轴）为 3 、纵轴（Y 轴）为 4 。计算机会告诉你打中了没有？打中哪一艘舰？你可以连续打。当你把整个一艘舰全打中，计算机就会告诉你把什么舰打沉了，并告诉你，发射的炮弹中没有命中的和命中的数目之比，即没命中的数/命中的数。最后全部击沉敌舰时，统计出你的上述比率（SPLASH/HIT RATIO），当然这个比率愈低愈好。

游戏开始时，计算机打印出一张示意图给你看，使你明白舰队设置的办法。

THE FOLLOWING CODE OF THE BAD GUYS' FLEET DISPOSITION
HAS BEEN CAPTURED BUT NOT DECODED:

```
0 0 0 2 2 6
0 4 4 4 6 0
5 0 0 6 0 0
5 0 6 0 0 3
5 1 0 0 0 3
5 0 1 0 0 3
```

（这仅是示意图，并非在游戏时按此布防）

```
START GAME
? 1,1
A DIRECT HIT ON SHIP NUMBER 6 (击中“6”)
TRY AGAIN.
? 4,1
A DIRECT HIT ON SHIP NUMBER 3 (击中“3”)
TRY AGAIN.
? 5,1
A DIRECT HIT ON SHIP NUMBER 3 (击中“3”)
TRY AGAIN.
? 6,1
A DIRECT HIT ON SHIP NUMBER 3  (击中”3“)
AND YOU SUNK IT. HURRAH FOR THE GOOD
    GUYS.                    (击沉 ″3″ )
SO FAR, THE BAD GUYS HAVE LOST
 0 DESTROYER(S),     1 CRUISER(S), AND     0
    AIRCAFT CARRIER(S).
YOUR CURRENT SPLASH/HIT RATIO IS 0
? 2,1
SPLASH! TRY AGAIN.     (未击中)
? 1,2
A DIRECT HIT ON SHIP NUMBER 2 (击中 “2”)
TRY AGAIN.
? 1,3
A DIRECT HIT ON SHIP NUMBER  2 (击中 “2”)
AND YOU SUMK IT. HURRAH FOR THE GOOD
    GUYS.                    (击沉″2″)
```

```
SO FAR, THE BAD GUYS HAVE LOST
1 DESTROYER(S),     1 CRUISER(S),  AND  0
   AIRCRAFT CARRIER(S).
YOUR CURRENT SPLASH/HIT RATIO IS.166667
? 3,7
INVALID INPUT. TRY AGAIN.
? 3,6
A DIRECT HIT ON SHIP NUMBER 5
TRY AGAIN.
? 4,6
A DIRECT HIT ON SHIP NUMBER 5
TRY AGAIN.
? 5,6
A DIRECT HIT ON SHIP NUMBER 5
TRY AGAIN.
? 6,4
A DIRECT HIT ON SHIP NUMBER 1
TRY AGAIN.
? 6,6
A DIRECT HIT ON SHIP NUMBER 5
AND YOU SUNK IT. HURRAH FOR THE GOOD
   GUYS.
SO FAR, THE BAD GUYS HAVE LOST
1 DESTROYER(S),     1 CRUISER(S),  AND   1
   AIRCRAFT CARRIER(S).
YOUR CURRENT SPLASH/HIT RATIO IS .090909
? 3,4
```

```
SPLASH!   TRY AGAIN.
? 2,2
A DIRECT HIT ON SHIP NUMBER 6
TRY AGAIN.
? 3,3
A DIRECT HIT ON SHIP NUMBER 6
TRY AGAIN.
? 4,4
A DIRECT HIT ON SHIP NUMBER 6
AND YOU SUNK IT. HURRAH FOR THE GOOD
   GUYS.
SO FAR, THE BAD GUYS HAVE LOST
1 DESTROYER(S),    1 CRUISER(S), AND    2
   AIRCRAFT CARRIER(S).
YOUR CURRENT SPLASH/HIT RATIO IS .142857
? 6,4
YOU ALREADY PUT A HOLE IN SHIP NUMBER
   1 AT THAT POINT.
SPLASH!   TRY AGAIN.
? 5,5
A DIRECT HIT ON SHIP NUMBER 1
AND YOU SUNK IT. HURRAH FOR THE GOOD
   GUYS.
SO FAR, THE BAD GUYS HAVE LOST
2 DESTROYER(S),    1 CRUISER(S), AND   2
   AIRCRAFT CARRIER(S).
YOUR CURRENT SPLASH/HIT RATIO IS .2
```

```
? 2,3
A DIRECT HIT ON SHIP NUMBER 4
TRY AGAIN.
? 2,4
A DIRECT HIT ON SHIP NUMBER 4
TRY AGAIN.
? 2,5
A DIRECT HIT ON SHIP ON SHIP NUMBER 4
AND YOU SUNK IT. HURRAH FOR THE GOOD
    GUYS.
SO FAR, THE BAD GUYS HAVE LOST
2 DESTROYER(S),    2 CRUISER(S), AND    2
    AIRCRAFT CARRIER(S).
YOUR CURRENT SPLASH/HIT RATIO IS .166667
YOU HAVE TOTALLY WIPED OUT THE BAD
    GUYS' FLEET
WITH A FINAL SPLASH/HIT RATIO OF .166667
* * * * * * * * * * * * * * * * * *
```

程序为:

```
10  DIM F(6,6), H(6,6), A(4),B(4), C(16), L(3)
50  FOR X=1 TO 6
51  FOR Y=1 TO 6
52  F(X,Y)=0
53  NEXT Y
54  NEXT X
60  FOR I=1 TO 3
```

```
70  N=4-I
80  FOR J=1 TO 2
90  A=INT(6*RND(0)+1)
100 B=INT(6*RND(0)+1)
110 D=INT(4*RND(0)+1)
120 IF F(A,B)>0 THEN 90
130 M=0
140 ON D GOTO 150,340,550,740
150 B(1)=B
160 B(2)=7:B(3)=7
170 FOR K=1 TO N
180 IF M>1 THEN 240
190 IF B(K)=6 THEN 230
200 IF F(A,B(K)+1)>0 THEN 230
210 B(K+1)=B(K)+1
220 GOTO 280
230 M=2
240 IF B(1)<B(2) AND B(1)<B(3) THEN Z=B(1)
242 IF B(2)<B(1) AND B(2)<B(3) THEN Z=B(2)
244 IF B(3)<B(1) AND B(3)<B(2) THEN Z=B(3)
250 IF Z=1 THEN 90
260 IF F(A,Z-1)>0 THEN 90
270 B(K+1)=Z-1
280 NEXT K
290 F(A,B)=9-2*I-J
300 FOR K=1 TO N
310 F(A,B(K+1))=F(A,B)
```

```
320 NEXT K
330 GOTO 990
340 A(1) = A
350 B(1) = B
360 A(2) = 0: A(3) = 0: B(2) = 0: B(3) = 0
370 FOR K = 1 TO N
380 IF M>1 THEN 460
390 IF A(K) = 1 OR B(K) = 1 THEN 450
400 IF F(A(K) - 1, B(K) - 1)>0 THEN 450
410 IF F(A(K) - 1, B(K))>0 AND F(A(K) - 1,
    B(K)) = F(A(K), B(K) - 1)THEN 450
420 A(K + 1) = A(K) - 1
430 B(K + 1) = B(K) - 1
440 GOTO 530
450 M = 2
460 IF A(1)>A(2) AND A(1)>A(3) THEN Z1 = A(1)
462 IF A(2)>A(1) AND A(2)>A(3) THEN Z1 = A(2)
464 IF A(3)>A(1) AND A(3)>A(2) THEN Z1 = A(3)
470 IF B(1)>B(2) AND B(1)>B(3) THEN Z2 = B(1)
474 IF B(2)>B(1) AND B(2)>B(3) THEN Z2 = B(2)
476 IF B(3)>B(1) AND B(3)>B(2) THEN Z2 = B(3)
480 IF Z1 = 6 OR Z2 = 6 THEN 90
490 IF F(Z1 + 1, Z2 + 1)>0 THEN 90
500 IF F(Z1,Z2 + 1)>0 AND F(Z1,Z2 + 1) = F(Z1 + 1,
    Z2) THEN 90
510 A(K + 1) = Z1 + 1
520 B(K + 1) = Z2 + 1
530 NEXT K: GOTO 950
```

```
550 A(1)=A
560 A(2)=7:A(3)=7
570 FOR K=1 TO N
580 IF M>1 THEN 640
590 IF A(K)=6 THEN 630
600 IF F(A(K)+1,B)>0 THEN 630
610 A(K+1)=A(K)+1
620 GOTO 680
630 M=2
640 IF A(1)<A(2) AND A(1)<A(3) THEN Z=A(1)
642 IF A(2)<A(1) AND A(2)<A(3) THEN Z=A(2)
644 IF A(3)<A(1) AND A(3)<A(2) THEN Z=A(3)
650 IF Z=1 THEN 90
660 IF F(Z-1,B)>0 THEN 90
670 A(K+1)=Z-1
680 NEXT K
690 F(A,B)=9-2*I-J
700 FOR K=1 TO N
710 F(A(K+1),B)=F(A,B)
720 NEXT K
730 GOTO 990
740 A(1)=A
750 B(1)=B
760 A(2)=7: A(3)=7
770 B(2)=0:B(3)=0
780 FOR K=1 TO N
790 IF M>1 THEN 870
```

```
800 IF A(K)=6 OR B(K)=1 THEN 860
810 IF F(A(K)+1,B(K)-1)>0 THEN 860
820 IF F(A(K)+1, B(K))>0 AND F(A(K)+1,
    B(K))=F(A(K),B(K)-1) THEN 860
830 A(K+1)=A(K)+1
840 B(K+1)=B(K)-1
850 GOTO 940
860 M=2
870 IF A(1)<A(2) AND A(1)<A(3) THEN Z1=A(1)
872 IF A(2)<A(1) AND A(2)<A(3) THEN Z1=A(2)
874 IF A(3)<A(1) AND A(3)<A(2) THEN Z1=A(3)
880 IF B(1)>B(2) AND B(1)>B(3) THEN Z2=B(1)
882 IF B(2)>B(1) AND B(2)>B(3) THEN Z2=B(2)
884 IF B(3)>B(1) AND B(3)>B(2) THEN Z2=B(3)
890 IF Z1=1 OR Z2=6 THEN 90
900 IF F(Z1-1,Z2+1)>0 THEN 90
910 IF F(Z1,Z2+1)>0 AND F(Z1,Z2+1)=F(Z1-1,
    Z2) THEN 90
920 A(K+1)=Z1-1
930 B(K+1)=Z2+1
940 NEXT K
950 F(A,B)=9-2*I-J
960 FOR K=1 TO N
970 F(A(K+1),B(K+1))=F(A,B)
980 NEXT K
990 NEXT J
1000 NEXT I
```

```
1010 PRINT
1020 PRINT "THE FOLLOWING CODE OF THE
     BAD GUYS' FLEET DISPOSITION"
1030 PRINT "HAS BEEN CAPTURED BUT NOT
     DECODED: "
1040 PRINT
1050 FOR I=1 TO 6
1051 FOR J=1 TO 6
1052 H(I,J)=F(J,I)
1053 NEXT J
1054 NEXT I
1060 FOR I=1 TO 6
1061 FOR J=1 TO 6
1062 PRINT H(I,J);
1063 NEXT J
1064 PRINT
1065 NEXT I
1100 PRINT
1110 FOR I=1 TO 6
1111 FOR J=1 TO 6
1112 H(I,J)=0
1113 NEXT J
1114 NEXT I
1120 FOR I=1 TO 3
1121 L(I)=0
1122 NEXT I
1130 C(1)=2:C(2)=2
```

```
1140 C(3)=1:C(4)=1
1150 C(5)=0:C(6)=0
1160 S=0:H=0
1170 PRINT "START GAME"
1180 INPUT X,Y
1190 IF X<1 OR X>6OR INT(X)<>ABS(X)THEN 1210
1200 IF Y>0 AND Y<7 AND INT(Y)=ABS(Y) THEN
     1230
1210 PRINT "INVALID INPUT.  TRY AGAIN."
1220 GOTO 1180
1230 R=7-Y
1240 C=X
1250 IF F(R,C)>0 THEN 1290
1260 S=S+1
1270 PRINT "SPLASH! TRY AGAIN."
1280 GOTO 1180
1290 IF C(F(R,C))<4 THEN 1340
1300 PRINT "THERE USED TO BE A SHIP AT
     THAT POINT, BUT YOU SUNK IT."
1310 PRINT "SPLASH!   TRY AGAIN."
1320 S=S+1
1330 GOTO 1180
1340 IF H(R,C)>0 THEN 1420
1350 H=H+1
1360 H(R,C)=F(R,C)
1370 PRINT "A DIRECT HIT ON SHIP NUMBER";
     F(R,C)
```

```
1380 C(F(R,C))=C(F(R,C))+1
1390 IF C(F(R,C))>=4 THEN 1470
1400 PRINT "TRY AGAIN."
1410 GOTO 1180
1420 PRINT "YOU ALREADY PUT A HOLE IN
     SHIP NUMBER";F(R,C);
1430 PRINT "AT THAT POINT."
1440 PRINT "SPLASH! TRY AGAIN."
1450 S=S+1
1460 GOTO 1180
1470 L((INT(F(R,C)-1)/2)+1)=L((INT(F(R, C)-
     1)/2)+1)+1
1480 PRINT "AND YOU SUNK IT. HURRAH FOR
     THE GOOD GUYS."
1490 PRINT "SO FAR, THE BAD GUYS HAVE
     LOST"
1500 PRINT L(1);"DESTROYER(S),      "; L(2);
     "CRUISER(S), AND  ";
1510 PRINT L(3);"AIRCRAFT CARRIER(S)."
1520 PRINT "YOUR CURRENT SPLASH/HIT RATIO
     IS";S/H
1530 IF (L(1)+L(2)+L(3))<6 THEN 1180
1540 PRINT
1550 PRINT "YOU HAVE TOTALLY WIPED OUT
     THE BAD GUYS' FLEET"
1560 PRINT "WITH A FINAL SPLASH/HIT RATIO
     OF";S/H
```

```
1570 IF S/H>0 THEN 1590
1580 PRINT "CONGRATULATIONS — A DIRECT
     HIT EVERY TIME."
1590 PRINT
1600 PRINT "*******************"
1610 PRINT
1620 GOTO 50
1630 END
```

52. 海　战

你和计算机各拥有一支舰队，分别布置在两个10×10的坐标系统内。每方都拥有四艘舰艇：一艘战斗舰（占五个位置），一艘巡洋舰（占三个位置），两艘驱逐舰（每艘各占两个位置）。舰艇的布置可按横的、竖的或斜线方向，但彼此不得重迭，且在游戏过程中不能移动。

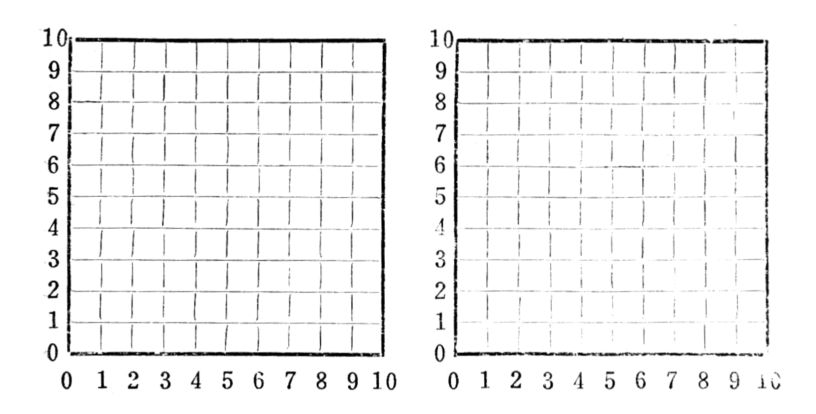
战斗舰每次可打炮三发，巡洋舰可打炮两发，驱逐舰可打炮一发，因此，在游戏开始时每方可打炮七发（3+2+1+1）。

游戏开始时，先布置你方的舰队，然后你打七发炮弹，将射击目标的坐标 x，y 打入计算机，计算机便告诉你打中了什么舰只。被击中的舰不能再发炮。谁先将对方的船只全部歼灭谁就为胜。

运行记录中：

? 5,1

表示要打对方 x=5，y=1 那一位置。




```
ENTER COORDINATES FOR...
BATTLESHIP
?  10,10
?  9,9
?  8,8
?  7,7
?  6,6
CRUISER
?  3,5
?  2,6
?  1,8
DESTROYER〈A〉
?  1,10
?  2,10
DESTROYER〈B〉
?  6,7
?  6,8
DO YOU WANT TO START? YES
```

(如果想看对方舰只位置，可打入“WHERE ARE YOUR SHIP?”)

DO YOU WANT TO SEE MY SHOTS? YES

(如在游戏中不要了解对方发射炮弹的情况，可打入"NO")

TURN 1

YOU HAVE 7 SHOTS.

? 5,1
? 5,2
? 5,3
? 5,4
? 5,5
? 5,6
? 5,7

YOU HIT MY DESTROYER⟨B⟩.

I HAVE 7 SHOTS.

(显示计算机一方发射情况)

10 8
10 10
8 10
9 9
9 10
10 9
8 8

I HIT YOUR BATTLESHIP

I HIT YOUR BATTLESHIP

I HIT YOUR BATTLESHIP

TURN 2

YOU HAVE 7 SHOTS.

? 4,1
? 4,3
? 4,5
? 4,7
? 6,2
? 6,4
? 6,6

```
I HAVE 7 SHOTS.

10      6
2       2
3       3
4       4
5       5
6       6
1       2

I HIT YOUR BATTLESHIP

TURN 3

YOU HAVE 7 SHOTS.

?   4, 2
?   4, 4
?   4, 6
?   6, 1
?   6, 3
?   6, 5
?   6, 7

YOU HIT MY DESTROYER⟨B⟩.

I HAVE 6 SHOTS.

 1    1
 4    3
 2    1
 2    3
 3    1
 3    2

TURN 4

YOU HAVE 7 SHOTS.

?  1,  1
?  1,  2
?  2,  2
?  2,  1
?  1,  3
?  2,  3
?  4,  4
```

```
YOU SHOT THERE BEFORE  ON TURN 3
? 3,4
I HAEV 6 SHOTS.
 1    3
 4    2
 5    3
 10   4
 1    7
 1    8
I HIT YOUR CRUISER
TURN 5
YOU HAVE 7 SHOTS.

?   1, 5
?   1, 7
?   1, 9
?   2, 4
?   2, 5
?   2, 6
?   2, 7
YOU HIT MY DESTROYER<A>.
I HAVE 6 SHOTS.
 6    2
 5    2
 10   3
 4    1
 5    1
 9    3
TURN 6
YOU HAVE 7 SHOTS.

?  1,  4
?  1,  6
?  1,  8
?  2,  8
```

```
?  2, 9
?  3, 6
?  3, 7
YOU HIT MY DESTROYER<A>.
I HAVE 5 SHOTS.
 9   4
 6   3
 6   4
 2   4
 5   4
TURN 7
YOU HAVE 7 SHOTS.
?  8 ,3
?  8 ,5
?  8 ,7
?  10,3
?  10,5
?  10,7
?  10,9
YOU HIT MY CRUISER.
YOU HIT MY CRUISER.
I HAVE 5 SHOTS.
 1   4
 2   6
 1   6
 9   5
 10  5
I HIT YOUR CRUISER
TURN 8
YOU HAVE 7 SHOTS.
?  8, 1
?  8, 2
?  8, 4
?  1, 10
```

```
?  2, 10
?  3, 10
?  4, 10
I HAVE 5 SHOTS.
1    5
8    4
8    5
2    5
2    7
TURN 9

YOU HAVE 7 SHOTS.
? 7,3
? 7,5
? 7,7
? 9,3
? 9,5
? 9,7
? 9,9
I HAVE 5 SHOTS.
 3   7
 8   6
 3   5
 3   6
 9   6
I HIT YOUR CRUISER
TURN 10
YOU HAVE 5 SHOTS.
?  9 , 1
?  9 , 2
?  9 , 4
?  9 , 6
?  9 , 8
```

```
YOU HIT MT CRUISER.
I HAVE 3 SHOTS.
10   2
 1   10
 2   8
I HIT YOUR DESTRORER<A>
TURN 11
YOU HAVE 5 SHOTS.
?  5, 9
?  6, 10
?  7, 9
?  8, 10
?  9, 9
YOU SHOT THERE BEFORE ON TURN 9
? 8,8
YOU HIT MY BATTLESHIP.
YOU HIT MY BATTLESHIP.
I HAVE 3 SHOTS.
 1    9
 2    9
 10   1
TURN 12
YOU HAVE 5 SHOTS.
?  3 ,9
?  4 ,9
?  6 ,9
?  8 ,9
?  10,10
YOU HIT MY BATTLESMIP.
YOU HIT MY BATTLESHIP.
```

```
YOU HIT MY BATTLESHIP.
I HAVE 0 SHTOS.
YOU HAVE WON.
```

程序如下：

```
1000 DIM A(10,10), B(10,10), C(7), D(7), E(12),
     F(12),G(12),H(12),K(10,10)
1050 Z8=0
1060 FOR W=1 TO 12
1070 E(W)=-1
1080 H(W)=-1
1090 NEXT W
1100 FOR X=1 TO 10
1110 FOR Y=1 TO 10
1120 B(X,Y)=0
1130 NEXT Y
1140 NEXT X
1150 FOR X=1 TO 12
1160 F(X)=0
1170 G(X)=0
1180 NEXT X
1190 FOR X=1 TO 10
1200 FOR Y=1 TO 10
1210 A(X,Y)=0
1220 NEXT Y
1230 NEXT X
1240 FOR K=4 TO 1 STEP-1
1250 U6=0
```

```
1260 GOSUB 2910
1270 DEF FNA(K) = (5 - K) * 3 - 2 * INT(K/4)
     + SGN(K - 1) - 1
1280 DEF FNB(K) = K + INT(K/4) - SGN(K - 1)
1290 IF V + V2 + V * V2 = 0 THEN 1260
1300 IF Y + V * FNB(K)>10 THEN 1260
1310 IF Y + V * FNB(K)<1 THEN 1260
1320 IF X + V2 * FNB(K)>10 THEN 1260
1330 IF X + V2 * FNB(K)<1 THEN 1260
1340 U6 = U6 + 1
1350 IF U6>25 THEN 1190
1360 FOR Z = 0 TO FNB(K)
1370 F(Z + FNA(K)) = X + V2 * Z
1380 G(Z + FNA(K)) = Y + V * Z
1390 NEXT Z
1400 U8 = FNA(K)
1405 IF U8>U8 + FNB(K) THEN 1460
1410 FOR Z2 = U8 TO U8 + FNB(K)
1415 IF U8<2 THEN 1450
1420 FOR Z3 = 1 TO U8 - 1
1430 IF SQR((F(Z3) - F(Z2)) ↑ 2 + (G(Z3) - G(Z2)) ↑ 2)
     <3.59 THEN 1260
1440 NEXT Z3
1450 NEXT Z2
1460 FOR Z = 0 TO FNB(K)
1470 A(F(Z + U8,G(Z + U8)) = .5 + SGN(K - 1)*(K - 1.5)
1480 NEXT Z
```

```
1490 NEXT K
1500 PRINT "ENTER COORDINTES FOR..."
1510 PRINT "BATTLESHIP"
1520 FOR X=1 TO 5
1530 INPUT Y,Z
1540 B(Y,Z)=3
1550 NEXT X
1560 PRINT "CRUISER"
1570 FOR X=1 TO 3
1580 INPUT Y,Z
1590 B(Y,Z)=2
1600 NEXT X
1610 PRINT "DESTROYER<A>"
1620 FOR X=1 TO 2
1630 INPUT Y,Z
1640 B(Y,Z)=1
1650 NEXT X
1660 PRINT "DESTROYER<B>"
1670 FOR X=1 TO 2
1680 INPUT Y,Z
1690 B(Y,Z)=.5
1700 NEXT X
1710 PRINT "DO YOU WANT TO START";
1720 INPUT J$
1730 IF J$< >"WHERE ARE YOUR SHIPS?" THEN
     1890
1740 PRINT "BATTLESHIP"
```

```
1750 FOR Z=1 TO 5
1760 PRINT F(Z);G(Z)
1770 NEXT Z
1780 PRINT "CRUISER"
1790 PRINT F(6);G(6)
1800 PRINT F(7);G(7)
1810 PRINT F(8);G(8)
1820 PRINT "DESTROYER<A>"
1830 PRINT F(9);G(9)
1840 PRINT F(10);G(10)
1850 PRINT "DESTROYER<B>"
1860 PRINT F(11);G(11)
1870 PRINT F(12);G(12)
1880 GOTO 1710
1890 C=0
1900 PRINT "DO YOU WANT TO SEE MY SHOTS";
1910 INPUT K$
1920 PRINT
1930 IF J$< >"YES" THEN 2620
1940 REM * * * * * * * * * * * * START
1950 IF J$< >"YES" THEN 1990
1960 C=C+1
1970 PRINT
1980 PRINT "TURN";C
1990 A=0
2000 FOR W=.5 TO 3 STEP .5
2010 FOR X=1 TO 10
```

```
2020 FOR Y=1 TO 10
2030 IF B(X,Y)=W THEN 2070
2040 NEXT Y
2050 NEXT X
2060 GOTO 2080
2070 A=A+INT(W+.5)
2080 NEXT W
2090 FOR W=1 TO 7
2100 C(W)=0
2110 D(W)=0
2120 F(W)=0
2130 G(W)=0
2140 NEXT W
2150 P3=0
2160 FOR X=1 TO 10
2170 FOR Y=1 TO 10
2180 IF A(X,Y)>10 THEN 2200
2190 P3=P3+1
2200 NEXT Y
2210 NEXT X
2220 PRINT "YOU HAVE";A;"SHOTS."
2230 IF P3>=A THEN 2260
2240 PRINT "YOU HAVE MORE SHOTS THAN
     THERE ARE BLANK SQUARES."
2250 GOTO 2890
2260 IF A<>0 THEN 2290
2270 PRINT "I HAVE WON."
```

```
2280 STOP
2290 FOR W=1 TO A
2300 INPUT X,Y
2310 IF X< >INT(X) THEN 2370
2320 IF X>10 THEN 2370
2330 IF X<1 THEN 2370
2340 IF Y< >INT(Y) THEN 2370
2350 IF Y>10 THEN 2370
2360 IF Y>=1 THEN 2390
2370 PRINT "ILLEGAL, ENTER AGAIN."
2380 GOTO 2300
2390 IF A(X,Y)>10 THEN 2440
2400 C(W)=X
2410 B(W)=Y
2420 NEXT W
2430 GOTO 2460
2440 PRINT "YOU SHOT THERE BEFORE ON
     TURN";A(X,Y)-10
2450 GOTO 2300
2460 FOR W=1 TO A
2470 IF A(C(W),D(W))=3 THEN 2540
2480 IF A(C(W),D(W))=2 THEN 2560
2490 IF A(C(W),D(W))=1 THEN 2580
2500 IF A(C(W),D(W))=.5 THEN 2600
2510 A(C(W),D(W))=10+C
2520 NEXT W
2530 GOTO 2620
```

```
2540 PRINT "YOU HIT MY BATTLESHIP."
2550 GOTO 2510
2560 PRINT "YOU HIT MY CRUISER."
2570 GOTO 2510
2580 PRINT "YOU HIT MY DESTROYER<A>."
2590 GOTO 2510
2600 PRINT "YOU HIT MY DESTROYER<B>."
2610 GOTO 2510
2620 A=0
2630 IF J$="YES" THEN 2670
2640 C=C+1
2650 PRINT
2660 PRINT "TURN";C
2670 A=0
2680 FOR W=.5 TO 3 STEP .5
2690 FOR X=1 TO 10
2700 FOR Y=1 TO 10
2710 IF A(X,Y)=W THEN 2750
2720 NEXT Y
2730 NEXT X
2740 GOTO 2760
2750 A=A+INT(W+.5)
2760 NEXT W
2770 P3=0
2780 FOR X=1 TO 10
2790 FOR Y=1 TO 10
2800 IF A(X,Y)>10 THEN 2820
```

```
2810 P3 = P3 + 1
2820 NEXT Y
2830 NEXT X
2840 PRINT "I HAVE";A;"SHOTS."
2850 IF P3>A THEN 2880
2860 PRINT "I HAVE MORE SHOTS THAN BLANK
     SQUARES."
2870 GOTO 2270
2880 IF A<>0 THEN 2960
2890 PRINT "YOU HAVE WON."
2900 STOP
2910 X = INT(RND(0) * 10 + 1)
2920 Y = INT(RND(0) * 10 + 1)
2930 V = INT(3*RND(0) - 1)
2940 V2 = INT(3*RND(0) - 1)
2950 RETURN
2960 FOR W = 1 TO 12
2970 IF H(W)>0 THEN 3800
2980 NEXT W
2990 REM * * * * * * * * * * * * *RANDOM
3000 W = 0
3010 R3 = 0
3020 GOSUB 2910
3030 RESTORE
3040 R2 = 0
3050 R3 = R3 + 1
3060 IF R3>100 THEN 3010
```

```
3070 IF X>10 THEN 3110
3080 IF X>0 THEN 3120
3090 X=1+INT(RND(0)*2.5)
3100 GOTO 3120
3110 X=10-INT(RND(0)*2.5)
3120 IF Y>10 THEN 3160
3130 IF Y>0 THEN 3270
3140 Y=1+INT(RND(0)*2.5)
3150 GOTO 3270
3160 Y=10-INT(RND(0)*2.5)
3170 GOTO 3270
3180 F(W)=X
3190 G(W)=Y
3200 IF W=A THEN 3380
3210 IF R2=6 THEN 3030
3220 READ X1, Y1
3230 R2=R2+1
3240 DATA 1,1,-1,1,1,-3,1,1,0,2,-1,1
3250 X=X+X1
3260 Y=Y+1
3270 IF X>10 THEN 3210
3280 IF X<1 THEN 3210
3290 IF Y>10 THEN 3210
3300 IF Y<1 THEN 3210
3310 IF B(X,Y)>10 THEN 3210
3320 FOR Q9=1 TO W
3330 IF F(Q9)< >X THEN 3350
```

```
3340 IF G(Q9)=Y THEN 3210
3350 NEXT Q9
3360 W=W+1
3370 GOTO 3180
3380 IF K$<>"YES" THEN 3420
3390 FOR Z5=1 TO A
3400 PRINT F(Z5);G(Z5)
3410 NEXT Z5
3420 FOR W=1 TO A
3430 IF B(F(W),G(W))=3 THEN 3500
3440 IF B(F(W),G(W))=2 THEN 3520
3450 IF B(F(W),G(W))=1 THEN 3560
3460 IF B(F(W),G(W))=.5 THEN 3540
3470 B(F(W),G(W))=10+C
3480 NEXT W
3490 GOTO 1950
3500 PRINT "I HIT YOUR BATTLESHIP"
3510 GOTO 3570
3520 PRINT "I HIT YOUR CRUISER"
3530 GOTO 3570
3540 PRINT "I HIT YOUR DESTROYER<B>"
3550 GOTO 3570
3560 PRINT "I HIT YOUR DESTROYER<A>"
3570 FOR Q=1 TO 12
3580 IF E(Q)< >-1 THEN 3730
3590 E(Q)=10+C
3600 H(Q)=B(F(W),G(W))
```

```
3610 M3=0
3620 FOR M2=1 TO 12
3630 IF H(M2)< >H(Q) THEN 3650
3640 M3=M3+1
3650 NEXT M2
3660 IF M3< >INT(H(Q)+.5)+1 + INT(INT(H(Q)+
     .5)/3) THEN 3470
3670 FOR M2=1 TO 12
3680 IF H(M2)< >H(Q) THEN 3710
3690 E(M2) = -1
3700 H(M2) = -1
3710 NEXT M2
3720 GOTO 3470
3730 NEXT Q
3740 PRINT "PROGRAM ABORT:"
3750 FOR Q=1 TO 12
3760 PRINT "E(";Q;")=";E(Q)
3770 PRINT "H(";Q;")=";H(Q)
3780 NEXT Q
3790 STOP
3800 REM * * * * * * * * * * * USINGEARRAY
3810 FOR R=1 TO 10
3820 FOR S=1 TO 10
3830 K(R,S)=0
3840 NEXT S
3850 NEXT R
3860 FOR U=1 TO 12
```

```
3870 IF E(U)<10 THEN 4020
3880 FOR R=1 TO 10
3890 FOR S=1 TO 10
3900 IF B(R,S)<10 THEN 3930
3910 K(R,S) = -10000000
3920 GOTO 4000
3930 FOR M=SGN(1-R) TO SGN(10-R)
3940 FOR N=SGN(1-S) TO SGN(10-S)
3950 IF N+M+N*M=0 THEN 3980
3960 IF B(R+M,S+N)< >E(U) THEN 3980
3970 K(R,S)=K(R,S)+E(U)-S*INT(H(U)+.5)
3980 NEXT N
3990 NEXT M
4000 NEXT S
4010 NEXT R
4020 NEXT U
4030 FOR R=1 TO A
4040 F(R)=R
4050 G(R)=R
4060 NEXT R
4070 FOR R=1 TO 10
4080 FOR S=1 TO 10
4090 Q9=1
4100 FOR M=1 TO A
4110 IF K(F(M),G(M))>=K(F(Q9),G(Q9)) THEN
     4130
4120 Q9=M
```

```
4130 NEXT M
4131 IF R>A THEN 4140
4132 IF R=S THEN 4210
4140 IF K(R,S)<K(F(Q9),G(Q9)) THEN 4210
4150 FOR M=1 TO A
4160 IF F(M)<>R THEN 4190
4170 IF G(M)=S THEN 4210
4180 NEXT M
4190 F(Q9)=R
4200 G(Q9)=S
4210 NEXT S
4220 NEXT R
4230 GOTO 3380
4240 END
```

53. 炮　　击

两个人（你和计算机各代表一方）在本方阵地设防。阵地划为 5 × 5 的方格，即各有 25 个方格，以 1—25 号码代表之。每方各有四队士兵，可以在你任选的四个方格内设防。你应设法用炮摧毁敌人的阵地，消灭对方四队士兵，同时，对方也想达到这样的目的。谁先消灭对方全部士兵者为胜。在开始时，先指定你的士兵设防地点，然后炮击敌军某一阵地（一次只能射击对方一个方格）。

```
YOU ARE ON A BATTLEFIELD WITH 4
    PLATOONS AND YOU
HAVE 25 OUTPOSTS AVAILABLE WHERE
```

THEY MAY BE PLACED.
YOU CAN ONLY PLACE ONE PLATOON AT ANY ONE OUTPOST.
THE COMPUTER DOES THE SAME WITH ITS FOUR PLATOONS.
THE OBJECT OF THE GAME IS TO FIRE MISSILES AT THE
OUTPOSTS OF THE COMPUTER. IT WILL DO THE SAME TO YOU.
THE ONE WHO DESTROYS ALL FOUR OF THE ENEMY'S PLATOONS
FIRST IS THE WINNER.
GOOD LUCK... AND TELL US WHERE YOU WANT THE BODIES SENT!
TEAR OFF MATRIX AND USE IT TO CHECK OFF THE NUMBERS.

```
1     2     3     4     5
6     7     8     9     10
11    12    13    14    15
16    17    18    19    20
21    22    23    24    25
```

WHAT ARE YOUR FOUR POSITIONS? 10,9,16,24
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 3
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 21.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 3
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 23.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
?13
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 22.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 11
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 13.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 9
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 15.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 25
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 12.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 5
HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 1.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 20

HA, HA YOU MISSED. MY TURN NOW

I GOT YOU. IT WON'T BE LONG NOW.POST
16 WAS HIT.
YOU HAVE ONLY THREE OUTPOSTS LEFT.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 21
HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 20.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 23
YOU GOT ONE OF MY OUTPOSTS.
ONE DOWN, THREE TO GO

I MISSED YOU, YOU DIRTY RAT. I PICKED 8.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 16

HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 4.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 15
HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 6.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
?14
YOU GOT ONE OF MY OUTPOSTS.
TWO DOWN, TWO TO GO

I GOT YOU. IT WON'T BE LONG NOW. POST
10 WAS HIT.
YOU HAVE ONLY TWO OUTPOSTS LEFT.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 13
HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 19.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 12
HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 7.

YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSITLE
? 11
HA, HA YOU MISSED. MY TURN NOW
I GOT YOU. IT WON'T BE LONG NOW. POST
  24 WAS HIT.
YOU HAVE ONLY ONE OUTPOST LEFT.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 1
HA, HA YOU MISSED.MY TURN NOW

I MISSED YOU, YOU DIRTY RAT. I PICKED 2.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 2
YOU GOT ONE OF MY OUTPOSTS.
THREE DOWN, ONE TO GO

I MISSED YOU, YOU DIRTY RAT. I PICKED 18.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 3
HA, HA YOU MISSED. MY TURN NOW

I MISSED YOU, YOU DIRTY RAT.I PICKED 3.
YOUR TURN.

WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 4

```
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, DIRTY RAT. I PICKED 14.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 22
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 25.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 12
HA, HA YOU MISSED. MY TURN NOW
I MISSED YOU, YOU DIRTY RAT. I PICKED 11.
YOUR TURN.
WHERE DO YOU WISH TO FIRE YOUR MISSILE
? 9
HA, HA YOU MISSED. MY TURN NOW
YOU'RE DEAD. YOUR LAST OUTPOST WAS
    AT 9. HA, HA, HA.
BETTER LUCK NEXT TIME.
```

程序为:

```
100 PRINT "YOU ARE ON A BATTLEFIELD
    WITH 4 PLATOONS AND YOU"
110 PRINT "HAVE 25 OUTPOSTS AVAILABLE
    WHERE THEY MAY BE PLACED."
120 PRINT "YOU CAN ONLY PLACE ONE
```

```
    PLATOON AT ANY ONE OUTPOST."
130 PRINT "THE COMPUTER DOES THE SAME
    WITH ITS FOUR PLATOONS."
135 PRINT
140 PRINT "THE OBJECT OF THE GAME IS TO
    FIRE MISSLES AT THE"
150 PRINT "OUTPOSTS OF THE COMPUTER.
    IT WILL DO THE SAME TO YOU."
160 PRINT "THE ONE WHO DESTROYS ALL
    FOUR OF THE ENEMY'S PLATOONS"
170 PRINT "FIRST IS THE WINNER."
180 PRINT
190 PRINT "GOOD LUCK... AND TELL US
    WHERE YOU WANT THE BODIES SENT!"
200 PRINT
210 PRINT "TEAR OFF MATRIX AND USE IT TO
    CHECK OFF THE NUMBERS."
220 PRINT
260 DIM M(100)
270 FOR R=1 TO 5
280 I=(R-1)*5+1
290 PRINT I,I+1,I+2,I+3,I+4
300 NEXT R
350 PRINT: PRINT
380 C=INT(RND)0)*25)+1
390 D=INT(RND(0)*25)+1
400 E=INT(RND(0)*25)+1
410 F=INT(RND(0)*25)+1
```

```
420 IF C=D THEN 390
430 IF C=E THEN 400
440 IF C=F THEN 410
450 IF D=E THEN 400
460 IF D=F THEN 410
470 IF E=F THEN 410
480 PRINT "WHAT ARE YOUR FOUR
    POSITIONS";
490 INPUT G,H,K,L
495 PRINT
500 PRINT "WHERE DO YOU WISH TO FIRE
    YOUR MISSLE"
510 INPUT Y
520 IF Y=C THEN 710
530 IF Y=D THEN 710
540 IF Y=E THEN 710
550 IF Y=F THEN 710
560 GOTO 630
570 M=INT(RND(0)*25)+1
575 GOTO 1160
580 IF X=G THEN 920
590 IF X=H THEN 920
600 IF X=L THEN 920
610 IF X=K THEN 920
620 GOTO 670
630 PRINT " HA HA, YOU MISSED. MY TURN
        NOW"
```

```
640 PRINT: GOTO 570
670 PRINT "I MISSED YOU, YOU DIRTY RAT. I
    PICKED";M;". ":PRINT "YOUR TURN."
680 PRINT: GOTO 500
710 Q=Q+1
720 IF Q=4 THEN 890
730 PRINT"YOU GOT ONE OF MY  OUTPOSTS."
740 IF Q=1 THEN 770
750 IF Q=2 THEN 810
760 IF Q=3 THEN 850
770 PRINT "ONE DOWN, THREE TO GO"
780 PRINT: GOTO 570
810 PRINT "TWO DOWN, TWO TO GO"
820 PRINT: GOTO 570
850 PRINT "THREE DOWN, ONE TO GO"
860 PRINT: GOTO 570
890 PRINT "YOU GOT  ME, I'M  GOING  FAST.
    BUT I'LL GET YOU WHEN"
900 PRINT " Y TRANSISTORS SECUPERA E"
910 GOTO 1235
920 Z=Z+1
930 IF Z=4 THEN 1110
940 PRINT "I  GOT YOU. IT  WON'T  BE  LONG
    NOW. POST";X;"WAS HIT."
950 IF Z=1 THEN 990
960 IF Z=2 THEN 1030
970 IF Z=3 THEN 1070
```

```
990 PRINT "YOU HAVE ONLY THREE
    OUTPOSTS LEFT."
1000 PRINT: GOTO 500
1030 PRINT "YOU HAVE ONLY TWO OUTPOSTS
    LEFT."
1040 PRINT: GOTO 500
1070 PRINT "YOU HAVE ONLY ONE OUTPOST
    LEFT."
1080 PRINT: GOTO 500
1110 PRINT "YOU'RE DEAD. YOUR LAST
    OUTPOST WAS AT";X;". HA,HA,HA."
1120 PRINT "BETTER LUCK NEXT TIME."
1150 GOTO 1235
1160 P=P+1
1170 N=P-1
1180 FOR T=1 TO N
1190 IF M=M(T) THEN 570
1200 NEXT T
1210 X=M
1220 M(P)=M
1230 GOTO 580
1235 END
```

54. 交　战

你和计算机进行一场小规模的"战争"。开始时各有军队72000 人，你可以指定其中陆军(ARMY)、海军(NAVY)、空

军(AIR FORCE)各多少人。然后向对方发动攻击，你从键盘上打入你使用的兵种和人数（以1代表陆军、2代表海军、3代表空军）。计算机会告诉你这次战争的结果（战斗后双方人力对比），然后你再决定下一次战斗的部署。两次战斗之后，计算机将根据统计的结果决定谁胜谁负、或平局。

```
I AM AT WAR WITH YOU.
WE HAVE 72000 SOLDIERS APIECE.
DISTRIBUTE YOUR FORCES.

              ME          YOU
ARMY          30000       ? 25000
NAVY          20000       ? 25000
A.F.          22000       ? 22000
YOU ATTACK FIRST.TYPE 1 FOR ARMY 2 FOR
   NAVY AND 3 FOR AIR FORCE.

? 3
HOW MANY MEN
? 22000
YOU WIPED OUT ONE OF MY ARMY PATROLS,
   BUT I DESTROYED
2 NAVY BASES AND BOMBED 3 ARMY BASES.
              YOU         ME
ARMY          6250        20000
NAVY          8333        20000
A.F.          22000       22000
WHAT IS YOUR NEXT MOVE?
ARMY=1 NAVY=2 AIR FORCE=3
```

```
? 3
HOW MANY MEN
? 20000
MY NAVY AND AIR FORCE IN A COMBINED
    ATTACK LEFT
YOUR COUNTRY IN SHAMBLES.
FROM THE RESULTS OF BOTH OF YOUR
    ATTACKS,
YOU LOST-I CONQUERED YOUR COUNTRY.
IT SERVES YOU
RIGHT FOR PLAYING THIS STUPID GAME!!!
```

程序如下：

```
4  PRINT "I AM AT WAR WITH YOU.": PRINT
   "WE HAVE 72000 SOLDIERS APIECE."
5  PRINT "DISTRIBUTE YOUR FORCES."
6  PRINT, "ME", "YOU"
7  PRINT "ARMY", 30000,
8  INPUT A
9  PRINT "NAVY", 20000,
10 INPUT B
11 PRINT "A.F.", 22000,
12 INPUT C
13 IF A+B+C>72000 THEN 5
14 D=30000
15 E=20000
16 F=22000
17 PRINT "YOU ATTACK FIRST. TYPE 1 FOR
```

```
    ARMY 2 FOR NAVY";
18  PRINT " AND 3 FOR AIR FORCE."
19  INPUT Y
20  PRINT "HOW MANY MEN"
21  INPUT X
22  IF X<0 THEN 20
23  ON Y GOTO 100,200,300
100 IF X>A THEN 20
105 IF X<A/3 THEN 120
110 IF X<2*A/3 THEN 150
115 GOTO 270
120 PRINT "YOU LOST";X;"MEN FROM YOUR
    ARMY."
125 A=INT(A-X)
130 GOTO 500
150 PRINT "YOU LOST";INT(X/3);"MEN BUT I
    LOST";INT(2*D/3)
155 A=INT(A-X/3)
160 D=0
165 GOTO 500
200 IF X>B THEN 20
210 IF X<E/3 THEN 230
215 IF X<2*E/3 THEN 250
220 GOTO 270
230 PRINT "YOUR ATTACK WAS STOPPED!"
232 B=INT(B-X)
235 GOTO 500
```

```
250 PRINT "YOU DESTROYED";INT(2*E/3);" OF
    MY ARMY"
255 E=INT(E/3)
260 GOTO 500
270 PRINT "YOU SUNK 1 OF MY PATROL
    BOATS BUT I WIPED OUT 2"
275 PRINT "OF YOUR A.F. BASES AND 3 ARMY
    BASES."
280 A=INT(A/3)
285 C=INT(C/3)
290 E=INT(2*E/3)
295 GOTO 500
300 IF X>C THEN 20
310 IF X<C/3 THEN 350
320 IF X<2*C/3 THEN 370
330 GOTO 380
350 PRINT "YOUR ATTACK WAS WIPED OUT."
355 C=INT(C-X)
360 GOTO 500
370 PRINT "WE HAD A DOGFIGHT-YOU
    WON- AND FINISHED YOUR MISSION."
375 D=INT(2*D/3)
377 E=INT(E/3)
378 F=INT(F/3)
379 GOTO 500
380 PRINT "YOU WIPED OUT ONE OF MY ARMY
    PATROLS, BUT I DESTROYED"
```

```
381 PRINT "2 NAVY BASES AND BOMBED 3
    ARMY BASES."
385 A=INT(A/4)
387 B=INT(B/3)
390 D=INT(2*D/3)
500 PRINT
501 PRINT, "YOU", "ME"
510 PRINT "ARMY", A,D
520 PRINT "NAVY", B,E
530 PRINT "A.F.",C,F
1000 PRINT "WHAT IS YOUR NEXT MOVE?"
1010 PRINT "ARMY=1 NAVY=2 AIR FORCE=3"
1020 INPUT G
1030 PRINT "HOW MANY MEN"
1040 INPUT T
1045 IF T<0 THEN 1030
1050 ON G GOTO 1600,1700,1800
1060 IF T>A THEN 1030
1610 IF T<D/2 THE 1630
1615 PRINT "YOU DESTROYED MY ARMY!"
1616 B=0
1617 GOTO 2000
1630 PRINT "I WIPED OUT YOUR ATTACK!"
1635 A=A-T
1640 GOTO 2000
1700 IF T>B THEN 1030
1710 IF T<E/2 THEN 1750
```

```
1720 GOTO 1770
1750 PRINT "I SUNK 2 OF YOUR BATTLESHIPS,
     AND MY AIR FORCE"
1751 PRINT "WIPED OUT YOUR UNGAURDED
     CAPITOL."
1755 A = A/4
1760 B = B/2
1765 GOTO 2000
1770 PRINT "YOUR NAVY SHOT DOWN THREE
     OF MY XIII PLANES, "
1771 PRINT "AND SUNK 3 BATTLESHIPS."
1775 F = 2*F/3
1780 E = (E/2)
1790 GOTO 2000
1800 IF T>C THEN 1030
1810 IF T>F/2 THEN 1830
1820 GOTO 1850
1830 PRINT "MY NAVY AND AIR FORCE IN A
     COMBINED ATTACK LEFT"
1831 PRINT "YOUR COUNTRY IN SHAMBLES."
1835 A = A/3
1837 B = B/3
1840 C = C/3
1845 GOTO 2000
1850 PRINT "ONE OF YOUR PLANES CRASHED
     INTO MY HOUSE. I AM DEAD."
1851 PRINT "MY COUNTRY FELL APART."
1860 GOTO 2010
```

```
2000 PRINT
2001 PRINT "FROM THE RESULTS OF BOTH OF
     YOUR ATTACKS,"
2002 IF A+B+C>3/2*(D+E+F) THEN 2010
2005 IF A+B+C<2/3*(D+E+F) THEN 2015
2006 PRINT "THE TREATY OF PARIS
     CONCLUDE THAT WE TAKE OUR"
2007 PRINT "RESPECTIVE COUNTRIES AND LIVE
     IN PEACE."
2008 GOTO 2020
2010 PRINT "YOU WON, OH! SHUCKS!!!!"
2012 GOTO 2020
2015 PRINT "YOU LOST-I CONQUERED YOUR
     COUNTRY. IT SERVES YOU"
2016 PRINT "RIGHT FOR PLAYING THIS
     STUPID GAME !!!"
2020 END
```

附录　TRS-80 BASIC 语句和函数简介以及将其转换成其它 BASIC 的方法

本书所列的程序基本上是依据 TRS—80 LEVEL Ⅱ DISK BASIC（小型磁盘的 BASIC 系统）规则写的。

程序中所用到的主要语句和函数如下：

语句	作用
CLS	清除显示屏画面，使每行容纳 64 个字符
DATA	置数据
DEF FNX(X)	自定义函数
DIM	只用来定义数组而不用来定义字符串大小（字符串所占内存空间用 CLEAR 语句指定）。数组下标从 0 开始。
END	结束
FOR...TO...STEP	先执行一次循环体然后再判断是否满足结束循环的条件。例如： 10　FOR I=2 TO 1 20　PRINT I 30　NEXT I 40　END 执行时将打印出一个“2”。在某些 BASIC（如 DJS—130）中，是先判断是否满足结束循环的条件。因此执行上述程序时，将一次也不会而执行 20 语句而跳过循环。

GOTO	无条件转移
GOSUB	转子程序
IF…THEN	不仅可以在 THEN 后面跟一语句标号，还可以直接跟一个或多个可执行语句，例如： 10　IF X>0 THEN PRINT X： 　　GOTO 100 20　PRINT X↑2 ⋮ 当 X=5 时，打印“5”然后转到 100 语句。当 X=－5 时打印 25。（注意：不满足 IF 语句给出的条件时，执行下一行（而不是本行中的下一个语句）。
INPUT	可以包括一个“提问字符串”。如： 10　INPUT "X="；X 执行时，打印出：X=？然后你打入 X 的值。
LET	这个“LET”字可以省略，如： 10　S=0　与 10　LET S=0 等价。
NEXT	循环终点
ON…GOTO	计算 GOTO 语句
ON…GOSUB	计算 GOSUB 语句
PRINT	打印
RANDOM	开启随机数发生器
READ	读数据

REM	注释语句。对写在本行中的其余语句不予执行。
RESTORE	恢复数据区指针
RETURN	从子程序返回
STOB	暂停

函数	作用
ABS(X)	绝对值函数
ASC(X$)	把 X$ 中第一个字符变成 ASCII 码。如 ASC("A") 的值为 65，ASC("B") 的值为 66，等等。
ATN	反正切
CHR$(X)	将一个 ASCII 码转换成一个字符，如 CHR$(65) 的值为“A”。
COS(X)	余弦函数
EXP(X)	指数函数
INT(X)	取整函数
LEFT$(X$,Y)	在 X$ 中取最左边的 Y 个字符
LEN(X$)	X$ 字符串中字符的个数。
LOG(X)	以 e 为底的对数：LOG_eX（或 lnX）
MID$(X$,Y,Z)	从 X$ 串中第 Y 个字符开始取 Z 个字符。 如果 M$="ABCDEFG" 则 MID$(M$,5,2) 的值为“EF”
RND(0)	取一个大于 0 小于 1 的随机数。
RIGHT$(X$,Y)	取 X$ 中最右边的 Y 个字符。
SGN(X)	符号函数。X 为负时其值为 -1；X 为 0 时，其值为 0；X 为正时，值为 +1。

SIN(X)	正弦函数。
SQR(X)	平方根函数。
STR$(X)	将 X 转换成字符串(X 是一个数学表达式）。如： STR$(1.23）的值是一个字符串"1.23".
TAB(X)	打印（显示）时，打印位置在该行上的第 X 个位置（一行从 0 位置算起）
TAN(X)	正切函数
VAL(X$)	STR$(X）的逆函数，将 X$ 字符串变成一个十进制数值。 如VAL("123.45")的值为数值 123.45。

本书程序中将用到以下一些功能，如果你的 BASIC 中无此功能，则应自己适当修改程序。

1． 一行允许多个语句。如：

```
10  A=1 : B=2 : C=3
```

可以改写为：

```
10  A=1
12  B=2
14  C=3
```

但要注意：

```
10  IF X=0 THEN PRINT X : GOTO 100
```

不应简单改写为：

```
10  IF X=0 THEN PRINT X
12  GOTO 100
```

因为当 X≠0 时，不执行 GOTO 100

有些 BASIC（如 PDP—11）不是用冒号（：）作为行内语句间的分隔符而是用反斜杠（＼）。

2. IF…THEN 后面可以跟一个可执行语句。

如：
```
10  IF X<0 THEN PRINT -X
20
 ⋮
```

而当有些 BASIC 不允许 THEN 后面跟一可执行语句时，可以改写为：

```
10  IF X<0 THEN 100
20
 ⋮
100 PRINT -X
110 GOTO 20
```

3. 有些 BASIC 版本（如 TRS—80 不带磁盘的LEVEL Ⅱ BASIC）不具备自定义函数。可以改写程序。如：

```
10  DEF FNA(X)=X↑3+2*X+1
 ⋮
100 T=FNA(10)+Q
```

可以改写为

```
10  REM FUNCTION DEFINITION REMOVED
 ⋮
100 T=10↑3+2*10+1+Q
```

4. 有的程序中用到字符串数组，如

```
10  DIM A$(10)
```

表示 A$ 为字符串数组，包含十一个元素（从 0—10），每个元素都是一个字符串变量。如：A$(0),…A$(10) 都是字符串的变量。

如果你的计算机上不能用字符串数组，而你又想用这些程序，则应将它改写为简单的字符串或数值数组、或一组 DATA

语句或建立数据文件。

5. 字符串函数在不同的 BASIC 中有不同的表示方法。本书中有的程序中用到子字符串函数，如：RIGHT $，LEFT$ 或 MID $…，而有些计算机（如 Crom、nco 或 DJS—130 等）的 BASIC 的子字符串函数不是用以上方法来表示的，应适当地改写。

如：RIGHT(X$,2) 表示 X$ 中最右边两个字符。如果你用 DJS—130，则可以改写为：

X$(LEN(X$)-1，LEN(X$)) 或 X$(LEN(X$-1))

如果 X$ 的长度为 10 个字符，它相当于：

X$(9，10) 或 X$(9)

即从第 9 个字符取到第 10 个字符。X$(9)表示从第 9 个字符开始取到最后一个字符。

如果是 Cromemco 的 BASIC，由于它的字符串位置是从 0 位置起算的，则应是：X$(8，9)，即从 0 开始数到 8，从这个字符开始取到位置为 9 的那个字符。应为：

X$(LEN(X$)-2，LEN(X$)-1)

如在本书的程序中有：

LEFT$(X$，2)，表示取最左两个字符。在 DJS—130 中应改为：X$(1，2)。在 Cromemco BASIC 中应改为 X$(0，1)。

如果遇到本书程序中有：

MID$(X$，5，2)，它表示从 X$ 中第 5 个字符开始取两个字符。在 DJS—130 中应改为：

X$(5，6) 从第 5 个字符开始取到第 6 个字符。

MID$ (X$，Y,Z)改写为：X$(Y，Y+Z-1)。Cromemco BASIC 中应改为：X$(Y-1，Y+Z-2)。

6. TRS—80 BASIC 不必对每一个字符串定义内存大小。而用 CLEAR n 语句开辟 n 个字节(每一字节中放一字符)放字符串，程序中用到的字符串中的字符个数的总数不应超过 n 。如果用 DJS—130 或 Cromemco BASIC，应对每一个字符串分别定义其长度。如在 DJS—130 中：

```
10  DIM A$(10), B$(20)
```

表示 A$ 字符串长度不超过 10，B$ 长度不超过 20。

7. 在 IF—THEN 语句中有时用到复合条件，如

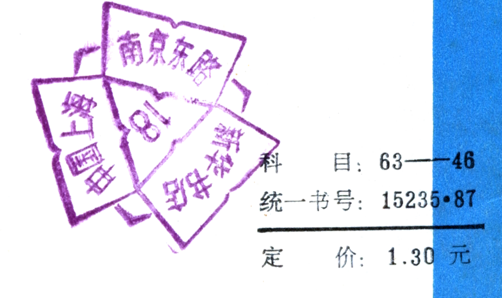
```
10  IF X>0 AND Y>0 THEN 100
20  (下一行)
 ⋮
70  IF T>0 OR W>0 THEN 200
```

等等。有的 BASIC 不允许用复合条件（不能出现 AND，OR，NOT 等逻辑运算符），可以改写如下：

```
10  IF X<=0 THEN 20
12  IF Y>0 THEN 100
20  (下一行)
以及
70  IF T>0 THEN 200
72  IF W>0 THEN 200
80  (下一行)
```

8. RND(0) 的值是 0～1 之间一个随机小数，每次给出不同的值。而在某些计算机所用的 BASIC 中写 RND(0) 则得到一个和前一次相同的随机小数。此时，改用 RND(1) 即可。如果每次运行都出现同一组随机数，可在程序开头加一个 RANDOM 语句（随机化语句），有的计算机（如 Cromemco）用 RANDOMIZE 语句。

封面设计：金德年



科　　目：63——46
统一书号：15235·87
定　　价：1.30 元

BASIC趣味程序选（一）

清华大学出版社